Nortel Business Communications Manager 450 1.0

Installation — System

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New in this release

The following sections detail what's new in Nortel Business Communications Manager 450 Installation — System (NN40160-301) for Release 1.0:

- Features (page 9)
- Other Changes (page 9)

Features

- Simplified DIP switch settings. MBMs are configured through Element Manager. For more information see MBM installation (page 43).
- Support for Norstar Legacy modules with the Fibre Expansion Module (MBM). For more information, see Fiber expansion module configuration (page 47).
- Upgradable capacity with the new Capacity Expansion Card (CEC). For more information, see Installing the CEC (page 83).

Other Changes

Revision History

July 2009

Standard 01.04. This document is up-issued to update technical information in the section "Connecting an external paging system".

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Introduction

This guide describes how to install the Business Communications Manager 450 Release 1.0 (BCM450 1.0) system.

The concepts, operations, and tasks described in this guide relate to the BCM450 system. This guide provides task-based information to install the hardware components.

The BCM450 1.0 provides private network and telephony management capability to small- and medium-sized businesses.

The BCM450 system

- integrates voice and data capabilities, and IP Telephony gateway functions into a single telephony system
- provides telephony applications for use in a business environment

Navigation

- Installation architecture (page 13)
- BCM450 installation preparation (page 17)
- BCM450 main unit and expansion cabinet installation (page 21)
- BCM450 main unit installation (page 25)
- Installing the BCM450 main unit on a rack (page 27)
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- BCM450 telephone and peripheral installation (page 79)
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- Analog device specifications (page 111)
- LED indicators reference (page 115)
- System information and tools (page 123)
- Default values reference (page 129)
- Wiring charts reference (page 131)

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Installation architecture

This chapter describes the architecture of a typical Business Communications Manager 450 (BCM450) system, including the main unit, expansion cabinets, and related equipment. The mounting options for your BCM450 system and the DHCP details are also discussed.

Navigation

- System architecture (page 13)
- DHCP and IP addressing (page 14)
- Mounting options (page 15)
- Miscellaneous features (page 16)
- Line and data connector wiring (page 16)

System architecture

The primary hardware component of your BCM450 system is the main unit. Each BCM450 system must have one main unit.

In addition to a main unit, the BCM450 system can include a BCM450 expansion cabinet. An expansion cabinet connects to the main unit and provides additional functionality through one or more installed media bay modules (MBM).

You can connect your BCM450 system directly to a power source or through an uninterruptible power supply (UPS).

For a visual representation of a BCM450 system, the following figure.

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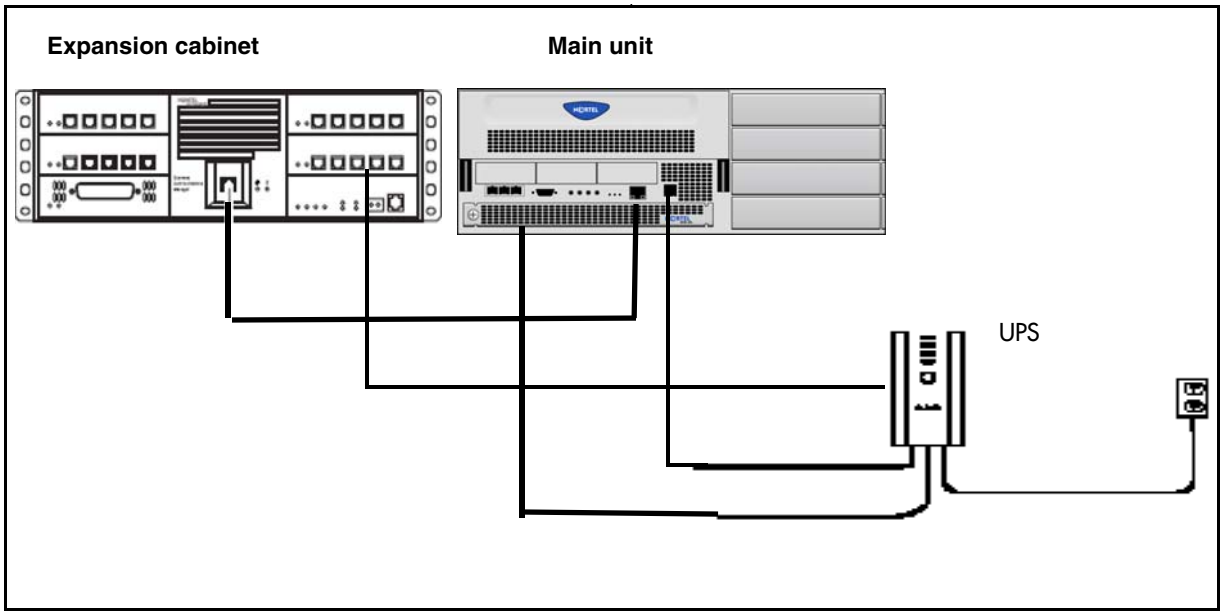
Figure 1 BCM450 system architecture



DHCP and IP addressing

Each main unit includes a dynamic host configuration protocol (DHCP) server. This DHCP server supplies Nortel IP Phones and client computers with IP addresses and connection information.

You can configure the DHCP server using Element Manager.

When the DHCP client is enabled, the main unit receives IP configuration from a DHCP server.

External DHCP server not available

If no external DHCP server is available, the main unit uses the following default IP configuration:

IP address: 192.168.2.2
Subnet mask: 255.255.254.0
Gateway: 192.168.1.1

The DHCP server on the main unit supplies IP configuration information for all IP devices (PCs and IP Phones). The DHCP server also supplies specific connection information to the IP Phones.

External DHCP server available

If an external DHCP is present, the BCM450 system uses the IP configuration supplied by the external DHCP server.

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The DHCP server on the main unit must configure a range of IP addresses to supply to the IP Phones.

The factory default DHCP server address range is set to 192.168.2.3 - 192.168.3.254. This allows for more than 500 addresses.

Use Element Manager to verify and change the default range.

The administrator must ensure that this range works with the network configuration; the external DHCP server does not use the range.

Mounting options

You typically install the main unit and expansion cabinet in the same manner. Ensure you install the expansion cabinets close enough to the main unit so you can connect the supplied 5 m (16 ft) expansion cable between the expansion cabinet and main unit.

Nortel provides three methods to install the BCM450 units:

- Rack-mount installation
- Wall-mount installation
- Desktop-mount installation

Rack-mount installation

You can install a BCM450 main unit in a standard 19-inch equipment rack along with your other networking and telecommunications equipment. You install the BCM450 expansion cabinet in a similar manner to the main unit.

Wall-mount installation

You can mount a BCM450 main unit or expansion cabinet on a wall. To mount the unit on a wall, you need the following items:

- A wall-mount bracket kit NTAB3422
- Four #10 x 2.5 cm (#10 x 1 in.) round-head wood screws
- A plywood backboard 2 cm (3/4 in.) thick

To mount the expansion cabinet, you need the following items:

- A wall-mount bracket (supplied with unit)
- Two #10 x 2.5 cm (#10 x 1 in.) round-head screws
- A plywood backboard 2 cm (3/4 in.) thick

Desktop-mount installation

You can install a BCM450 main unit or expansion cabinet on a desktop or a shelf.

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Miscellaneous features

The following sections describe some additional features of the BCM450 system.

External music source

You can connect an external music source for music on hold. For more information about installing an external music source, see Connecting the music source using the music source jack (page 72).

Analog telephones and devices

You can use an analog terminal adapter (ATA2) to install analog telephones and data devices, such as fax machines, on your BCM450 system. For more information about installing an ATA2, see Analog terminal adapter installation (page 85).

Element Manager

You can use Element Manager to configure and monitor your BCM450 system. For more information about installing Element Manager on a PC, see Element Manager installation (page 91).

Startup Profile

An experienced administrator can use the Startup Profile tool with common BCM parameters. You can use the Startup profile to quickly configure one or multiple systems.

Create the Startup Profile using the Startup Profile template (a Microsoft Excel template). Then use a USB storage device to transfer the Startup Profile data to the BCM main unit. For more information about Startup Profile and templates, see *Nortel Business Communications Manager 450 1.0 Configuration—System* (NN40160-503).

Attention: Voicemail parameters are not available through Startup Profile.

Line and data connector wiring

For information about connecting telephone and data lines to media bay modules (MBMs), see Lines and extensions connection (page 63). For information about connecting the BCM450 to a LAN, see LAN connection (page 75).

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BCM450 installation preparation

Verify that your site meets all requirements and that you have the required main unit and expansion cabinet components before you install the BCM450 system.

Prerequisites to BCM450 installation preparation

- The BCM450 expansion cabinet is an optional component. The expansion module increases the number of media bay modules (MBMs) you can install in the system.

BCM 450 installation preparation procedures

This task flow shows you the sequence of procedures you perform to prepare to install your BCM450 system. To link to any procedure, go to BCM450 installation preparation navigation (page 18).

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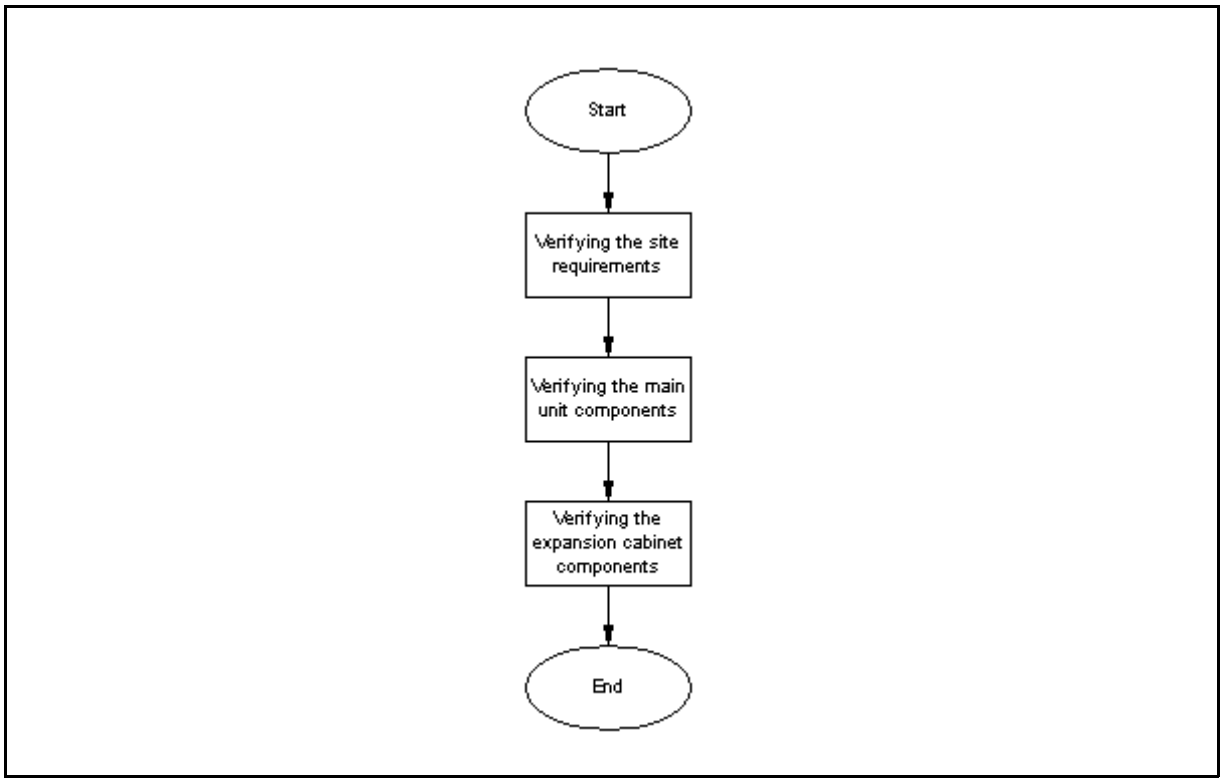
Figure 2 BCM450 installation preparation procedures



BCM450 installation preparation navigation

- Verifying the site requirements (page 18)
- Verifying the main unit components (page 19)
- Verifying the expansion cabinet components (page 19)
- Preinstallation checklists (page 20)

Verifying the site requirements

Before you install the BCM450 system, verify that your site meets the installation requirements.

Prerequisites

- For details about environmental, electrical, and telephony-wiring requirements, see Preinstallation reference (page 103).

Procedure steps

Step	Action
1	Determine the location for the main unit (and optional expansion cabinet), telephones, and other equipment.

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2	Order the required trunks from the central office.
3	Ensure that the system complies with the environmental requirements.
4	Ensure that the system complies with the electrical requirements.
5	Ensure that the system complies with the site telephony-wiring requirements.

--End--

Verifying the main unit components

Before you install the BCM450 main unit, verify that you have the required components and that the components are not damaged.

Procedure steps

Step	Action
1	Open the BCM450 main unit box and remove the components.
2	Verify that you have one BCM450 main unit.
3	Verify that you have one power supply cable.
4	Verify that you have four rubber feet.
5	Verify that you have one set of rack-mount brackets.
6	Verify that you have a documentation CD.
7	Verify that you have the Installation Checklist and Quick Start Guide.
8	Visually inspect the components for damage during shipping.
9	If you find damage or if you do not have all components, contact your Nortel sales representative.

--End--

Verifying the expansion cabinet components

Before you install the optional BCM450 expansion cabinet, verify that you have the required components, and that they are not damaged.

Procedure steps

Step	Action

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1. Open the BCM450 expansion cabinet box and remove the components.
2. Verify that you have one BCM450 expansion cabinet.
3. Verify that you have one power supply cable.
4. Verify that you have one expansion cable (shielded Ethernet cable).
5. Verify that you have four rubber feet.
6. Verify that you have the correct media bay modules (MBMs).
7. Visually inspect the components for damage during shipping.
8. If you find damage or if you do not have all components, contact your Nortel sales representative.

--End--

Preinstallation checklists

For preinstallation checklists, see Installation Checklist and Quickstart Guide (NN40160-300).

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BCM450 main unit and expansion cabinet installation

To install a BCM450 system, you must install a BCM450 main unit, and an optional expansion cabinets with media bay modules (MBM).

Prerequisites to main and expansion cabinet installation

- A BCM450 system requires a main unit, and can include an optional expansion cabinet.

BCM450 main unit and expansion cabinet installation tasks

This work flow shows you the sequence of tasks you perform to install a main unit and expansion cabinet. To link to any tasks, go to BCM450 main unit and expansion cabinet installation navigation (page 22).

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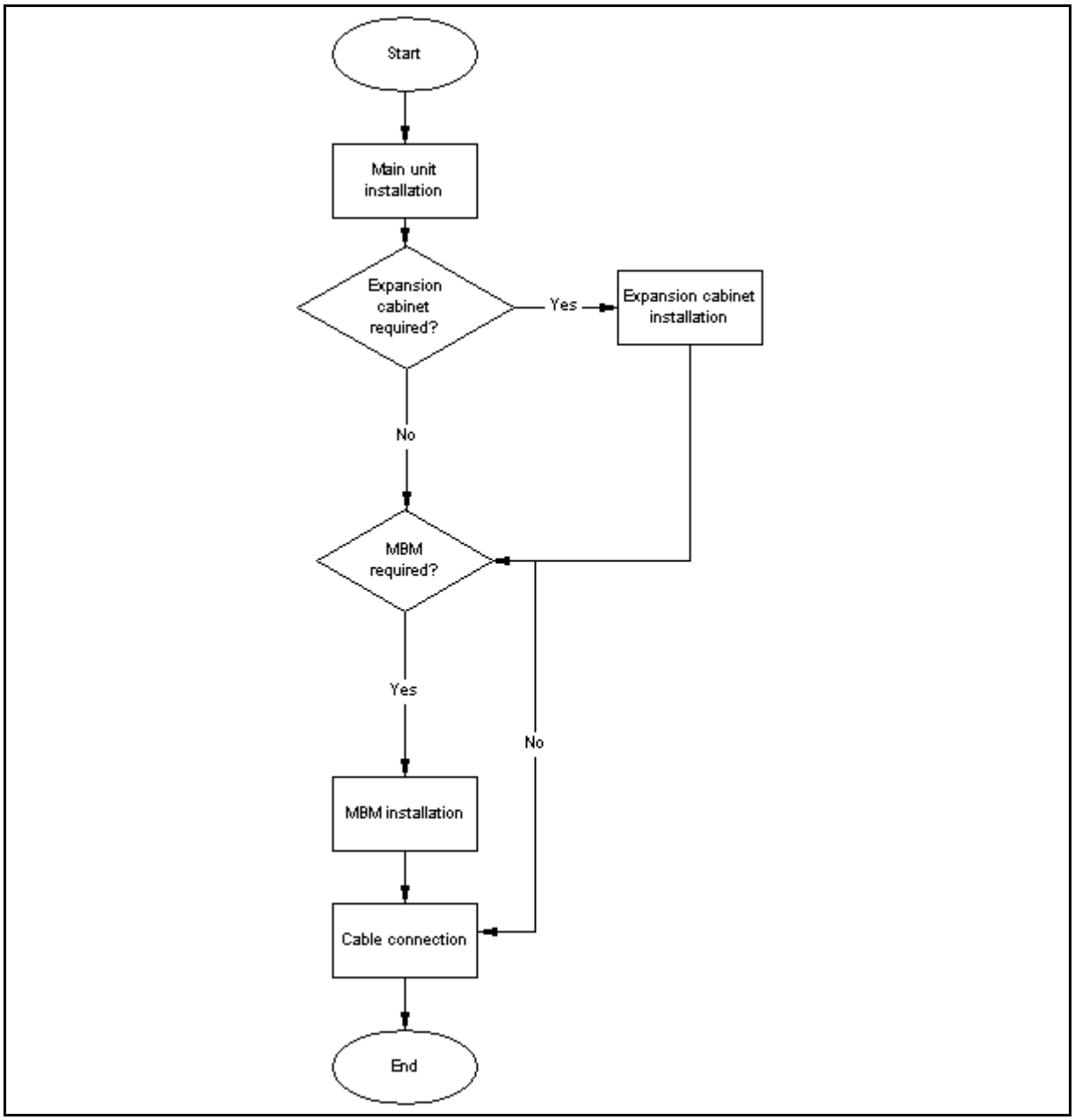
Figure 3 BCM450 main unit and expansion cabinet installation tasks



BCM450 main unit and expansion cabinet installation navigation

- BCM450 main unit installation (page 25)
- BCM450 expansion cabinet installation (page 37)
- MBM installation (page 43)
- BCM450 cable connection (page 55)

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BCM450 main unit installation

This chapter describes how to install a BCM450 main unit. You can install the main unit in a standard 19-inch equipment rack, on a wall, or on a desktop.

Prerequisites to main unit installation

- To operate the BCM450 main unit at the optimal internal temperature, ensure the top, sides, and rear clear of obstructions and away from the exhaust of other equipment.
- Ensure no objects are on top of the main unit.

Main unit installation tasks

This work flow shows you the sequence of tasks you perform to install a main unit. To link to any tasks, go to BCM450 main unit installation navigation (page 26).

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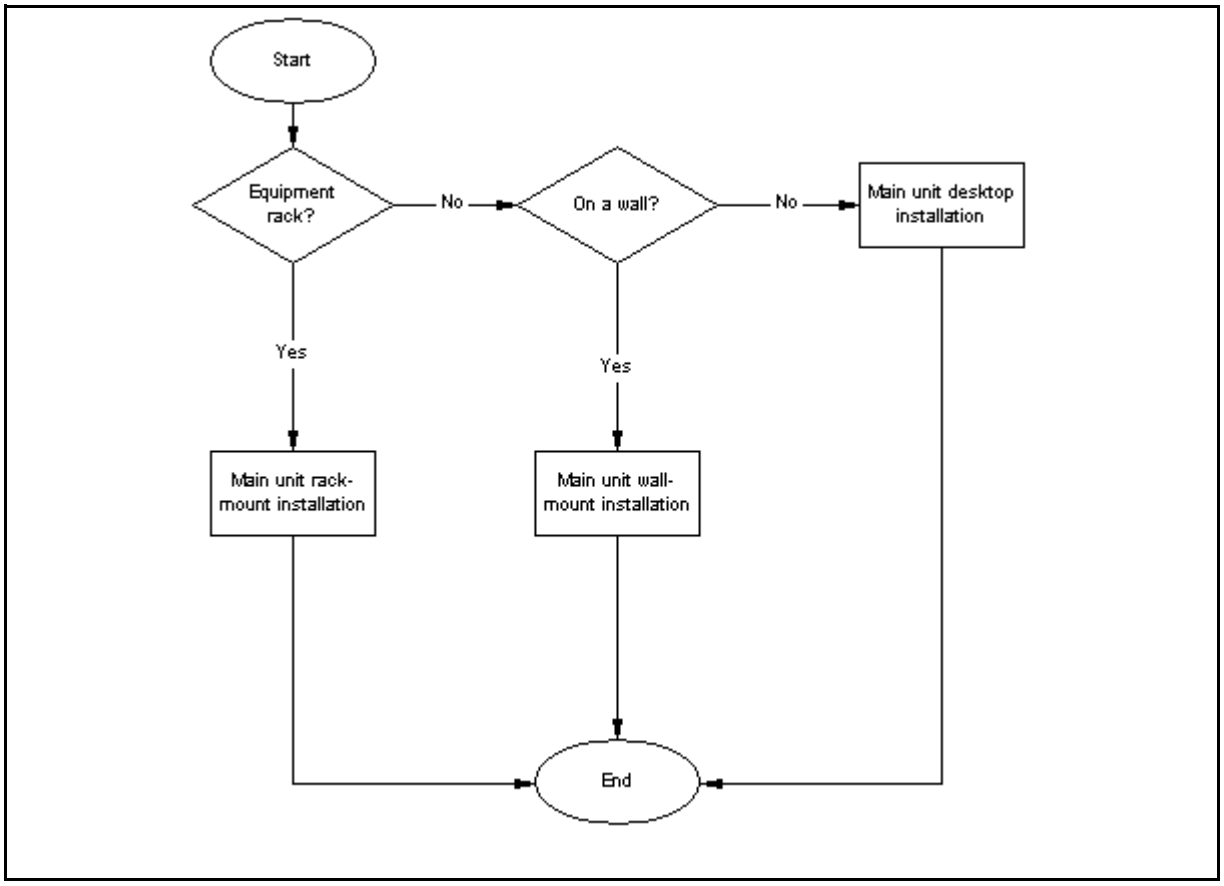
Figure 4 BCM450 main unit installation tasks



BCM450 main unit installation navigation

- Installing the BCM450 main unit on a rack (page 27)
- BCM450 main unit wall-mount installation (page 31)
- BCM450 main unit desktop installation (page 35)

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Installing the BCM450 main unit on a rack

BCM450 main unit rack-mount installation procedures

Attach the rack-mount brackets to the BCM450 main unit.

Prerequisites

- Use only the screws supplied with the rack-mount bracket. Other screws can damage the BCM450 main unit.

Procedure steps

Step	Action
1	Place the BCM450 main unit on a flat, clean surface.
2	Align the screw holes between the BCM450 main unit and the right rack-mount bracket.
3	Fasten the bracket to the BCM450 main unit using four screws.

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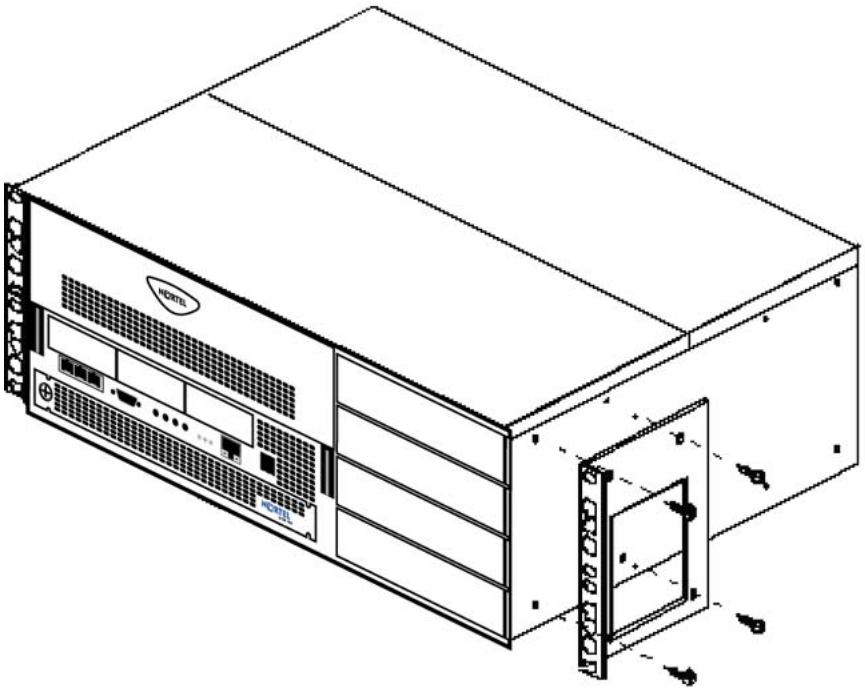
Figure 5 Attaching the rack-mount bracket



4 Align the screw holes between the BCM main unit and the left rack-mount bracket.

5 Fasten the bracket to the main unit using four screws.

6 Determine the location in the rack where you want to install the main unit.

7 Position the main unit in the rack. Have an assistant hold the main unit.

8 Align the holes in the rack-mount bracket with the holes in the equipment rack rails.

9 Fasten the rack-mount brackets to the rack using the four supplied rack screws.

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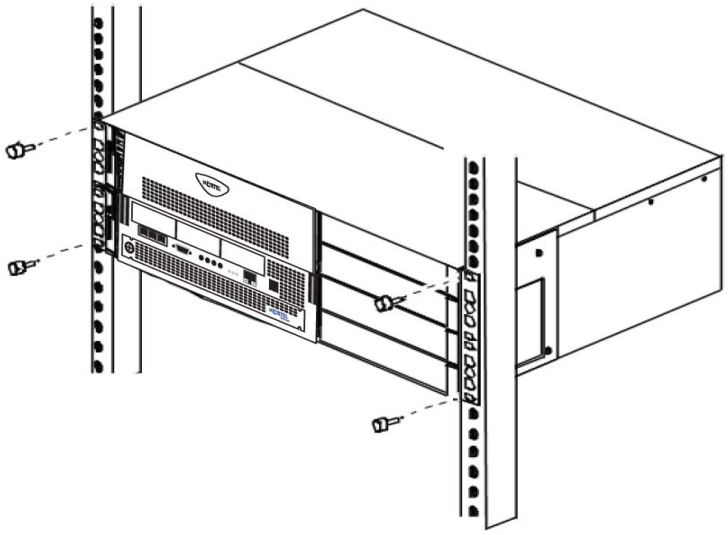
Figure 6 Mounting the BCM450 on a rack



--End--

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BCM450 main unit wall-mount installation

This chapter describes how to install a BCM450 main unit on a wall. To wall-mount a BCM450 unit, you need a wall-mount bracket. The BCM450 unit connects to the wall-mount bracket.

Prerequisites to BCM450 main unit wall-mount installation

- wall-mount bracket kit NTAB3422
- four #10 x 2.5cm (#10 x 1in.) round-head wood screws
- plywood backboard 2 cm (3/4 in.) thick

BCM450 main unit wall-mount installation procedures

This task flow shows you the sequence of procedures you perform to install a main unit on the wall. To link to any procedure, go to BCM450 main unit wall-mount installation navigation (page 32).

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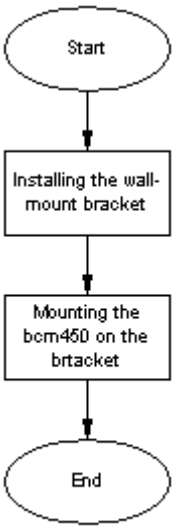
Figure 7



BCM450 main unit wall-mount installation procedures
BCM450 main unit wall-mount installation navigation

- Mounting the backboard (page 32)
- Installing the main unit using a wall-mount bracket (page 33)

Mounting the backboard

Mount a plywood backboard on a wall to simplify installation of your BCM450 main unit and optional expansion cabinet.

Prerequisites

- Ensure plywood backboard is 2 cm (3/4 in.) thick.
- Obtain a pencil, ruler, screwdriver, and a level.
- Obtain appropriate screws and optional wall anchors to attach the backboard to the wall.

Procedure steps

Step	Action
1	Use a pencil to mark the desired location of the plywood backboard on the wall.
2	Use a ruler and a level to make sure that the plywood backboard is level.
3	Mount the plywood backboard securely to the wall with appropriate screws.

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--End--

Installing the main unit using a wall-mount bracket

To install your BCM450 system on a wall, you must install a wall-mount bracket for the main unit and optional expansion cabinet.

Prerequisites

- Obtain five #8 x 2 cm (#8 x 0.75 in.) round-head wood screws to attach the wall-mount bracket to the backboard (or wall).
- Obtain tools for the installation including a screwdriver (for the wood screws), a level, and a pencil.

Procedure steps

Step	Action
1	Place the wall-mount bracket on the backboard (or wall) and mark the location of the screw holes. Use a bubble level to ensure that the wall-mount bracket is level with the plywood backboard.
2	Install four #10 x 2.5 cm (#10 x 1 in.) round-head screws in the backboard. Leave approximately 0.5 cm (0.25 in.) of each screw exposed from the backboard (or wall).
3	Hang the wall-mount bracket on the installed screws.
4	Use a level to make sure the wall-mount bracket is level.
5	Remove the wall-mount bracket from the backboard.
6	Align the screw holes on one side of the BCM450 main unit with the wall-mount bracket.
7	Fasten the wall-mount brackets securely to the BCM450 main unit by using the screws provided.
8	Hang the BCM main unit on the backboard screws. Make sure the main unit is level. Ensure the wood screw heads seat fully into the wall-mount bracket slots.
9	Tighten the wood screws against the wall-mount bracket.

--End--

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BCM450 main unit desktop installation

This chapter describes how to install a BCM450 main unit on a desktop or other flat surface that can support the weight of the main unit.

Prerequisites

- Locate the four self-adhesive rubber feet.
- Leave enough space around the BCM450 main unit for ventilation and access to the cables.

Procedure steps

Step	Action
1	Remove the paper backing from the four enclosed self-adhesive rubber feet.
2	Attach the four self-adhesive rubber feet to the bottom of the main unit.
3	Position the main unit on a desktop or shelf.

--End--

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BCM450 expansion cabinet installation

This chapter describes how to install a BCM450 expansion cabinet. You can install the expansion cabinet in a standard 19-inch equipment rack, on a wall, or on a desktop.

Add an expansion cabinet to increase the capacity of your BCM450 system.

Prerequisites to expansion cabinet installation

- To operate the BCM450 expansion cabinet at the optimal internal temperature, ensure the top, sides, and rear clear of obstructions and away from the exhaust of other equipment.
- Ensure no objects are on top of the expansion cabinet.

BCM450 expansion cabinet installation procedures

This task flow shows you the sequence of procedures you perform to install an expansion cabinet. To link to any procedures, go to BCM450 expansion cabinet installation navigation (page 38).

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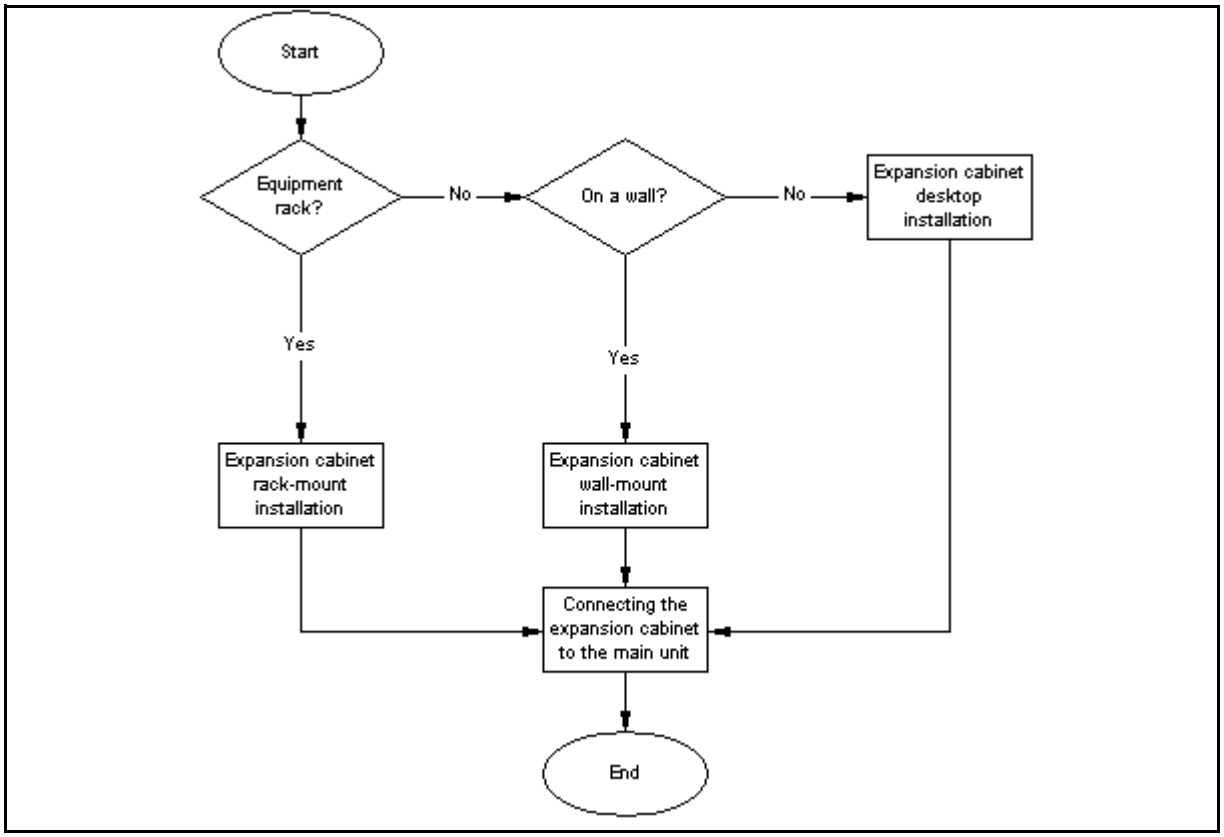
Figure 8 BCM450 expansion cabinet installation procedures



BCM450 expansion cabinet installation navigation

- Mounting the expansion cabinet in an equipment rack (page 38)
- Installing the expansion cabinet on a wall (page 39)
- Installing the expansion cabinet on a desktop (page 40)
- Connecting the expansion cabinet to the main unit (page 41)

Mounting the expansion cabinet in an equipment rack

You can install your BCM450 expansion cabinet in a standard 19-inch equipment rack.

Prerequisites

- Use only the screws supplied with the BCM450 expansion cabinet. Other screws can damage the BCM450 expansion cabinet.

Procedure steps

Step	Action
1	Place the expansion cabinet on a flat, clean surface.

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2	Align the screw holes between the expansion cabinet and the right rack-mount bracket.
3	Fasten the bracket to the expansion cabinet by using the four screws.
4	Align the screw holes between the expansion cabinet and the left rack-mount bracket.
5	Fasten the bracket to the expansion cabinet by using four screws.
6	Determine the location in the rack where you want to install the expansion cabinet.
7	Position the expansion cabinet in the rack. Have an assistant hold the expansion cabinet.
8	Align the holes in the rack-mount bracket with the holes in the equipment rack rails.
9	Fasten the rack-mount brackets to the rack using the four supplied rack screws.

--End--

Installing the expansion cabinet on a wall

To mount the BCM450 expansion cabinet on a wall, you must install the expansion cabinet on the previously installed wall-mount bracket. You cannot install the expansion cabinet directly on a wall.

Prerequisites

- A wall-mount bracket kit (NTAB3422).
- Obtain five #8 x 2 cm (#8 x 0.75 in.) round-head wood screws to attach the wall-mount bracket to the backboard (or wall).
- Obtain tools for the installation including a screwdriver (for the wood screws), a level, and a pencil.
- You can install a plywood backboard onto the wall to simplify the installation of the expansion cabinet. For more information, see Mounting the backboard (page 32).
- Obtain an appropriate screwdriver.

Step	Action
1	Place the wall-mount bracket on the backboard (or wall) and mark the location of the screw holes. Use a bubble level to ensure that the wall-mount bracket is level with the plywood backboard.

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2	Install four #10 x 2.5 cm (#10 x 1 in.) round-head screws in the backboard. Leave approximately 0.5 cm (0.25 in.) of each screw exposed from the backboard (or wall).
3	Hang the wall-mount bracket on the installed screws.
4	Use a level to make sure the wall-mount bracket is level.
5	Remove the wall-mount bracket from the backboard.
6	Align the screw holes on one side of the BCM450 expansion cabinet with the wall-mount bracket.
7	Fasten the wall-mount brackets securely to the BCM450 expansion cabinet using the screws provided.
8	Hang the expansion cabinet on the backboard screws. Make sure the expansion cabinet is level. Ensure the wood screw heads seat fully into the wall-mount bracket slots.
9	Tighten the wood screws against the wall-mount bracket.

--End--

Installing the expansion cabinet on a desktop

If you cannot install your BCM450 expansion cabinet in an equipment rack or on a wall, you can install your expansion cabinet on a desktop or shelf.

Prerequisites

- Locate the four self-adhesive rubber feet.
- Leave enough space around the expansion cabinet for ventilation and access to the cables.

Procedure steps

Step	Action
1	Remove the paper backing from the four enclosed self-adhesive rubber feet.
2	Attach the four self-adhesive rubber feet to the bottom of the expansion cabinet.
3	Position the expansion cabinet on a desktop or shelf.

--End--

Connecting the expansion cabinet to the main unit

Connect the expansion cabinet to the main unit to gain additional functionality provided by the MBMs.

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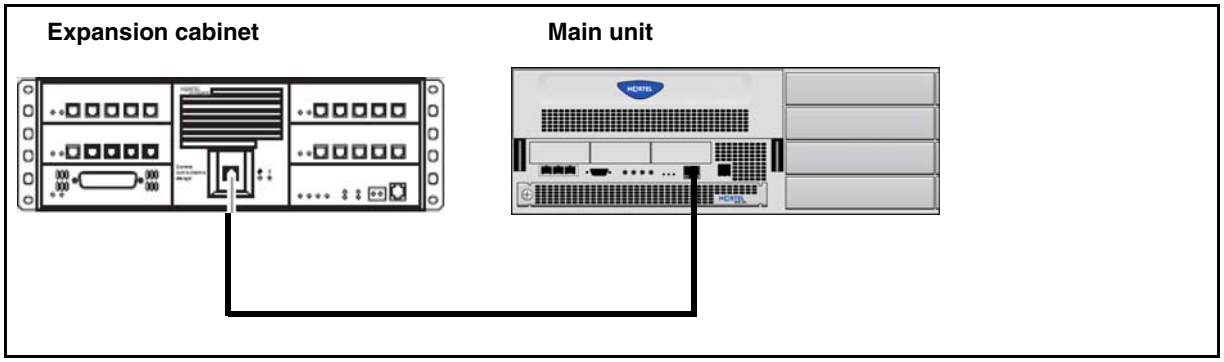
Prerequisites

- A DS256 cable (NTAB3086, supplied).

Attention: The timing in the BCM450 system is critical. Use the correct length of cable as supplied with the expansion cabinet (5 m). The system cannot function properly if you connect the BCM expansion cabinet using a cable of a different length.

Procedure steps

Step	Action
1	Plug one end of the supplied DS256 cable in the DS256 connector on the expansion cabinet.



2	Plug the other end of the cable into the DS256 connector on the faceplate of the MSC in the BCM450 main unit.

--End--

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MBM installation

To add a media bay module (MBM) to your system, configure the DIP switches for your MBM and install it into the main unit or expansion cabinet. Each MBM you add increases the number of public switched telephone network (PSTN) trunks or extensions that you can connect to the BCM450 system. For more information about the types and functionality of MBMs, see *Business Communication Manager 450 1.0 Installation—Devices* (NN40160-302).

Prerequisites to MBM installation

- The MBMs are safety-approved for installation into the BCM450 system. The installer and user must ensure that hardware installation does not compromise existing safety approvals or local electrical code regulations for telecommunications equipment and wiring installation.

MBM installation procedures

This task flow shows you the sequence of procedures you perform to install an MBM in a main unit or an expansion cabinet. To link to any procedure, go to MBM installation procedures (page 44).

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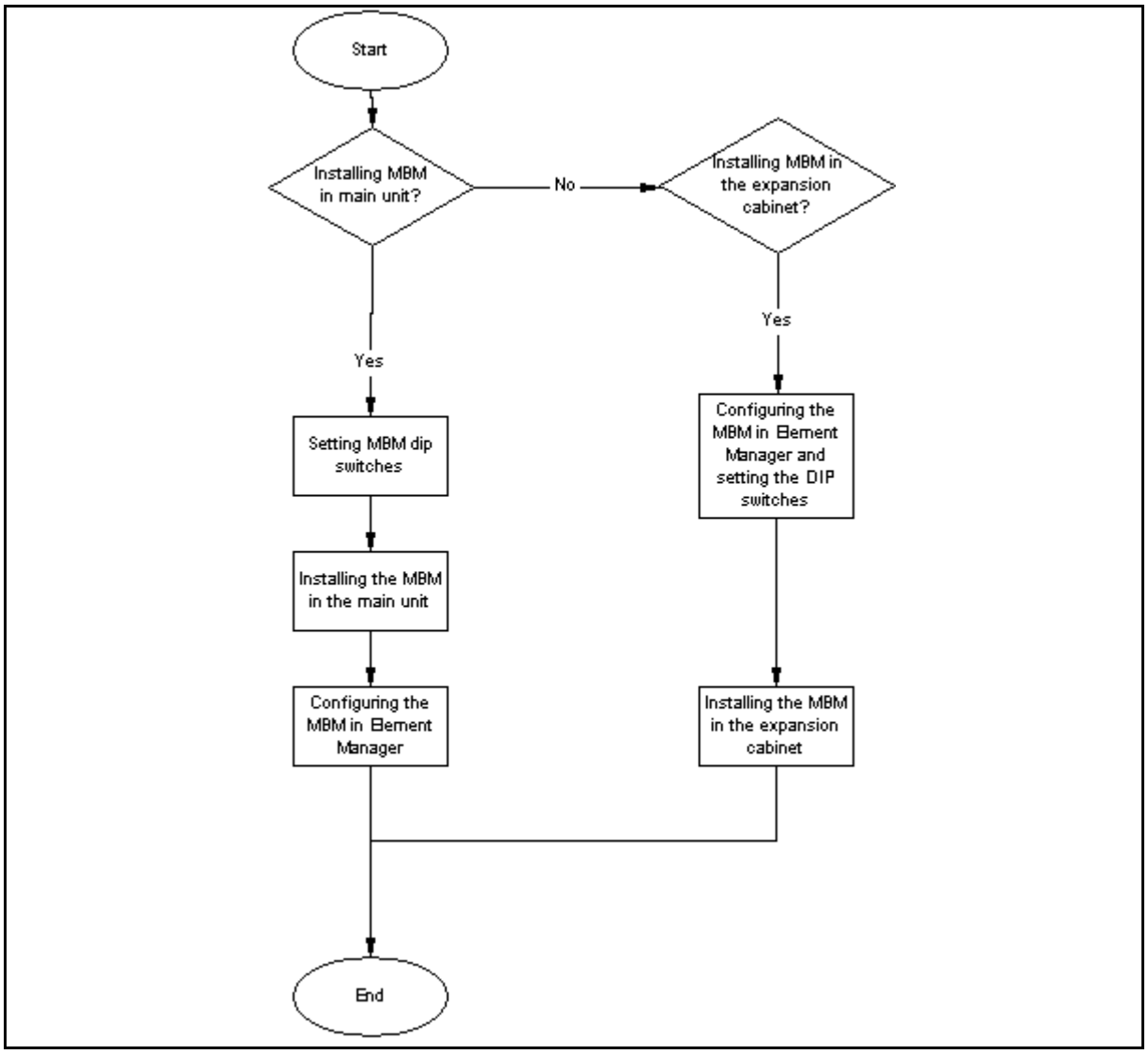
Figure 9 MBM installation procedures


Start
Installing MBM in main unit?
No
Installing MBM in the expansion cabinet?
Yes
Yes
Setting MBM dip switches
Configuring the MBM in Element Manager and setting the DIP switches
Installing the MBM in the main unit
Configuring the MBM in Element Manager
Installing the MBM in the expansion cabinet
End

MBM installation navigation

- Configuring the G4x16 or G8x16 DIP switches (page 45)
- Configuring the GASM DIP switches (page 46)
- Configuring the GATM DIP switches (page 46)
- To connect the fiber cables (page 48)
- Configuring MBMs for main unit installation (page 50)
- Fiber expansion module configuration (page 47)
- Configuring MBMs for expansion cabinet installation (page 51)
- Installing an MBM in the main unit or an expansion cabinet (page 52)

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Configuring the G4x16 or G8x16 DIP switches

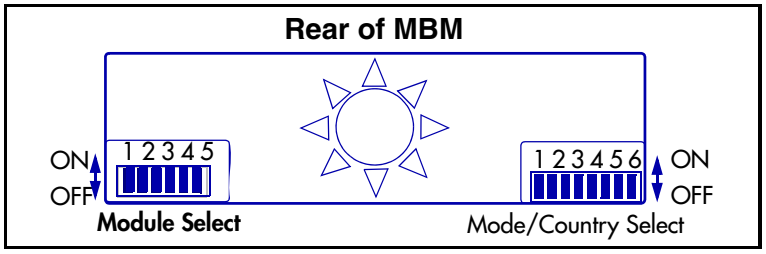
Use this procedure to configure the DIP switches before you install the G4x16 or G8x16 MBM into the main unit.

Prerequisites

- For information about lines and DNs settings for the G4x16 and G8x16 MBMs, see G4x16 and G8x16 wiring chart (page 137).

Procedure steps

Step	Action
1	Locate the Module Select and Mode/Country Select DIP switches at the rear of the G4x16 or G8x16 MBM.
2	Configure the Module Select DIP switches (on the left side at the rear of the module) to on (up).
3	Configure the Mode/Country Select DIP switches (on the right side at the rear of the module) to off (down). The G4x16 and G8x16 MBMs automatically download the country profiles.



--End--

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Configuring the GASM DIP switches

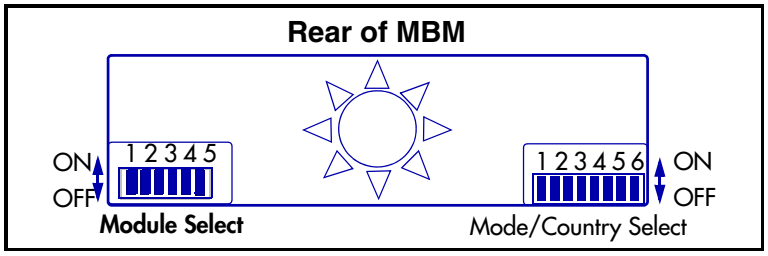
Use the procedure to configure the DIP switches before you install the GASM into the main unit.

Prerequisites

- For information about the GASM DIP switch settings, see GASM DIP switch configuration (page 107).

Procedure steps

Step	Action
1	Locate the Module Select and Mode/Country Select DIP switches at the rear of the GASM.



2	Configure the Module Select DIP switches (on the left side at the rear of the module) to on (up).
3	Configure the Mode Select DIP switches (switches 1 to 3, on the right side at the rear of the module) according to the requirements for your BCM450 system.
4	Configure the Country Select DIP switches (switches 4 to 8, on the right side at the rear of the module) according to the regional requirements for your BCM450 system.

--End--

Configuring the GATM DIP switches

Before you install the GATM into the main unit, configure the DIP switches to the default factory positions. Make the required modifications by using the software.

Procedure steps

Step	Action

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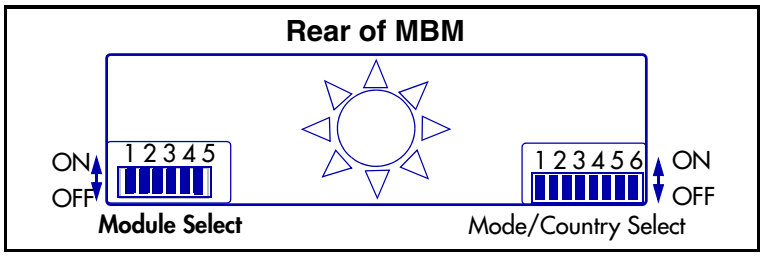
1 Locate the Module Select and Mode/Country Select DIP switches at the rear of the GATM.



2 Configure the Module Select DIP switches (on the left side at the rear of the module) to on (up).

3 Configure the Mode/Country Select DIP switches (on the right side at the rear of the module) to off (down).

The GATM automatically downloads the country profiles.

--End--

Fiber expansion module configuration

The Fiber Expansion media bay module (FEM) connects a maximum of six Norstar expansion modules (Norstar TM, Norstar SM, and Norstar ASM) to the Business Communications Manager system. These connections provide a quick way to upgrade a Norstar system to a Business Communications Manager system.

The front bezel of the FEM has six connectors. These connections are made using fiber cables between the FEM module and the Norstar expansion modules. Beside each connector, an LED lights when the fiber port is enabled.

BCM450 supports one FEM installed in the main unit. Ensure that all dip switches are set to the On (up) position before installing the FEM. After the FEM is installed, ensure that all six connector LEDs are on.

Wiring the FEM

A fiber expansion module (FEM) allows you to upgrade from a Norstar system to a BCM50 system by reusing the Norstar MBMs. The MBMs connect to the FEM using the same fiber cable that connected them to the Norstar fiber expansion card.

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Warning: Handling optical fiber cables

If the cable is too long, ensure that it is coiled correctly using the fiber spool. Coil excess fiber cable carefully around the spool provided. Do not bend the cable around any tight corners. Bends in the fiber cable must not be less than 100 mm in diameter. Place the fiber cable spool into a slot at the back of the cable trough in the Norstar TM or SM.

To connect the fiber cables

1 Ensure the BCM50 system is powered up and functional.

2 Connect the fiber cables from the Norstar MBMs to the jacks on the FEM.

   a Connect the Norstar Line Modules to the FEM beginning at fiber port 1.

   b Connect Norstar Extension Modules to the FEM beginning at fiber port 6.

3 Change the DN records in Element Manager or change the set wiring, as required, to match your system.

Warning: When you connect a Norstar Station Module to an FEM, the extension numbers of the telephones connected to the Station Module may change. To keep the same extension numbers, you must change the DNs of the telephones or change the telephone wiring to correspond with the required DNs.

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Note: If you connect a Norstar station MBM amphenol cable directly to a DSM, you do not have to modify the wiring connections. Ensure you select the correct DS30 number.

Table 1 compares the designated extension numbers on the Norstar and on the BCM50 systems.

Table 1 Extension comparison chart

Ports	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DS30 bus 2, FEM port 1																
Norstar	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236
BCM	225	226	227	228	221	222	223	224	233	234	235	236	229	230	231	232
DS30 bus 3, FEM port 2																
Norstar	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252
BCM	241	242	243	244	237	238	239	240	249	250	251	252	245	246	247	248
DS30 bus 4, FEM port 3																
Norstar	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268
BCM	257	258	259	260	253	254	255	256	265	266	267	268	261	262	263	264
DS30 bus 5, FEM port 4																
Norstar	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284
BCM	273	274	275	276	269	270	271	272	281	282	283	284	277	278	279	280
DS30 bus 6, FEM port 5																
Norstar	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
BCM	289	290	291	292	285	286	287	288	297	298	299	300	293	294	295	296
DS30 bus 7, FEM port 6																
Norstar	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316
BCM	305	306	307	308	301	302	303	304	313	314	315	316	309	310	311	312

Configuring the MBM DIP switches for main unit installation

Before you install the MBM into the main unit, configure the DIP switches to the default factory positions.

Procedure steps

Step	Action

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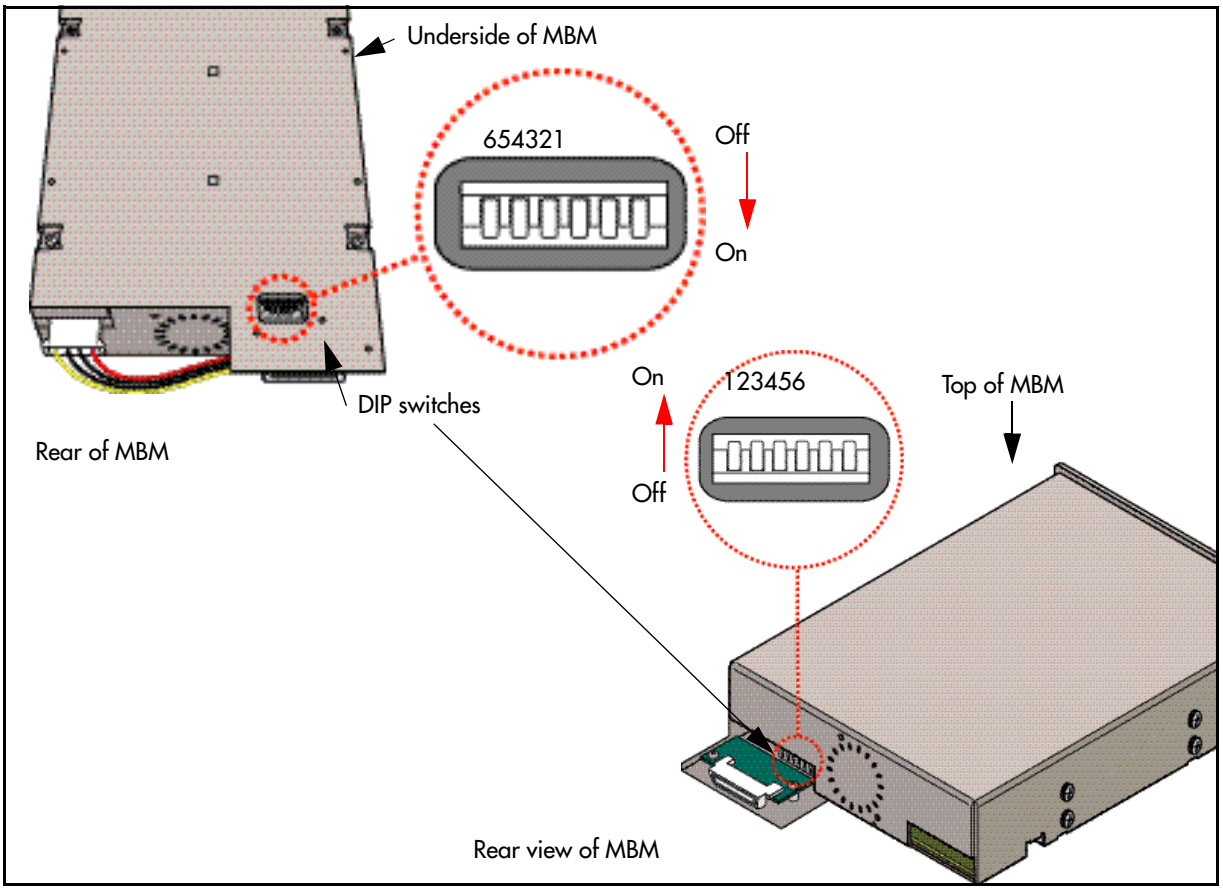
1 Locate the DIP switches at the rear or underside of the MBM.



2 Configure all DIP switches to on.

--End--

Configuring MBMs for main unit installation

Before installing an MBM in the expansion cabinet, configure it through Element Manager and set the DIP switches.

Prerequisites

- Before configuring an MBM, install it in the main unit.

Procedure steps

Step	Action
1	In Element Manager, navigate to **Configuration > Resources > Telephony Resources**.

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2 Choose the MBM bay (i.e. **Main 1**) that you want to configure.

3 Under Configured Device, select the type of MBM you want to install.

4 Press **Configure**.

5 Enter the **Start DN**, **Public received digits/OLI**, **Private received digits/OLI**, and **Start Line** depending on the type of MBM.

6 Select or leave clear the **Assign target lines** check box.

7 Repeat for each media bay module you want to install.

--End--

Configuring MBMs for expansion cabinet installation

Before installing an MBM in the expansion cabinet, configure it through Element Manager and set the DIP switches.

Procedure steps

Step	Action
1	In Element Manager, navigate to **Configuration > Resources > Telephony Resources**.
2	Select Expansion 1 from the table. A menu appears.
3	Choose the MBM bay (i.e. **Expansion 1.1**) that you want to configure.
4	Under Configured Device, select the type of MBM you want to install.
5	Press **Configure**.
6	Enter the Start DN, Public received digits/OLI, Private received digits/OLI, and Start Line depending on the type of MBM.
7	Select or leave clear the Assign target lines check box.
8	Locate the DIP switches at the rear or underside of the MBM.

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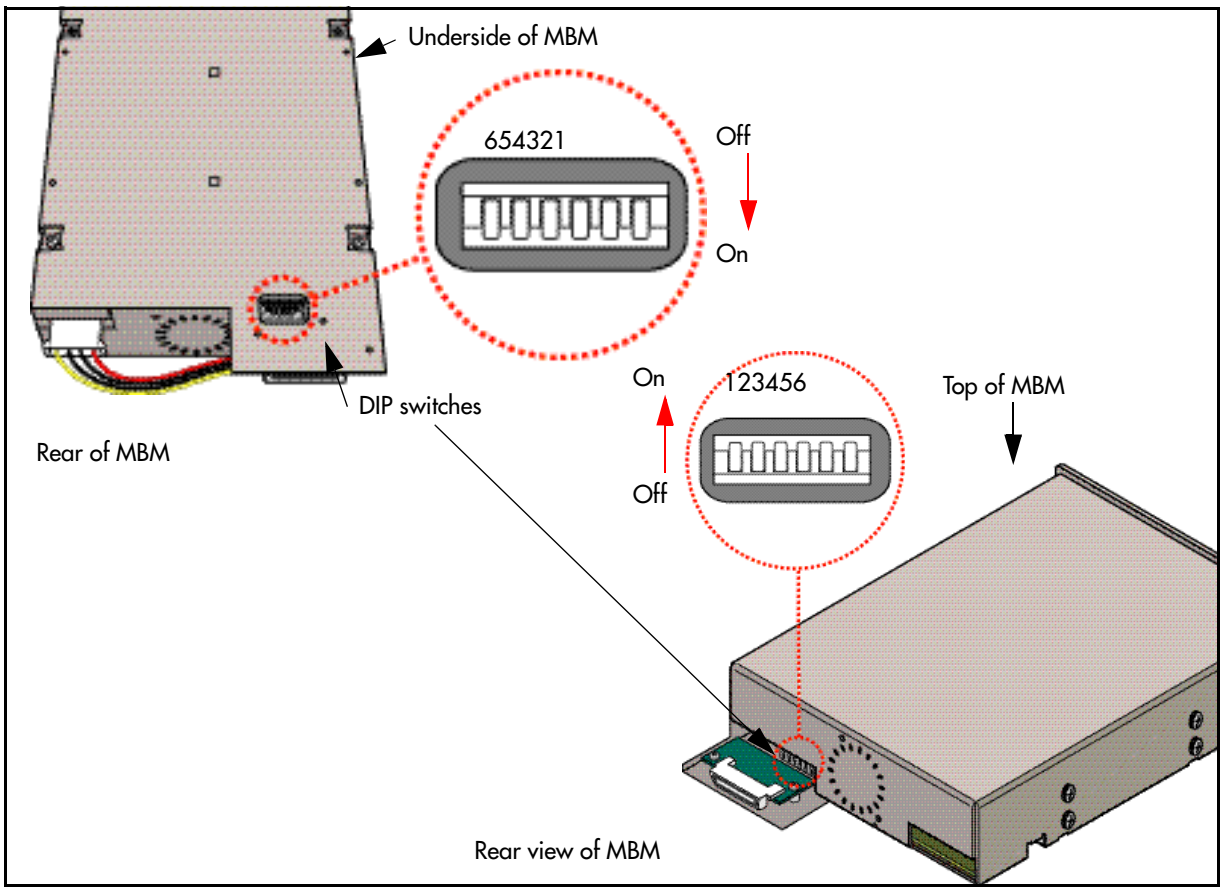

9 Set the switches to correspond with the settings shown in the Configure window.

10 Repeat for each media bay module you want to install.

--End--

Installing an MBM in the main unit or an expansion cabinet

After configuring the DIP switches on an MBM, you can install it in the BCM450 main unit or expansion cabinet.

Prerequisites

- Ensure that the DIP switches are configured correctly. For more information about configuring the DIP switches, see Configuring the G4x16 or G8x16 DIP switches (page 45), Configuring the GASM DIP switches (page 46), Configuring the GATM DIP switches (page 46), To connect the fiber cables (page 48), Fiber expansion module configuration (page 47)or Configuring MBMs for expansion cabinet installation (page 51).

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- MBMs are configured through Element Manager. If installing an MBM in the main unit, configure it after it is installed. If installing the MBM in the expansion cabinet, configure the MBM before installing it. For more information on configuring MBMs for the expansion cabinet, see Configuring MBMs for expansion cabinet installation (page 51)

Attention: Due to power constraints, a maximum of 2 GASM MBMs are supported in the main unit. Up to 4 GASM MBMs can be installed on the expansion cabinet.

CAUTION
Make sure the power supply to the expansion cabinet is disconnected before inserting or removing an MBM.

CAUTION
Risk of equipment damage
To prevent damage from electrostatic discharge, always wear an antistatic wrist strap connected to an ESDS grounding jack whenever you handle printed circuits.

Procedure steps

Step	Action
1	Select an open media bay.
2	Hold the MBM with the face of the MBM toward you.
3	Push the MBM completely into the MBM bay until you hear a click.

--End--

R2MFC MBM installation

The R2MFC MBM is a media bay module (MBM) that provides MFC-R2 connectivity over an E1 trunk. The module works as a converter between Euro-ISDN and MFC-R2 protocols to allow the MFC-R2 protocol E1 to work directly with the BCM without the use of an external converter. The BCM recognizes the converter as a Euro-ISDN trunk MBM and, therefore, provides all of the functionality on the MFC-R2 E1 that is available on a Euro-ISDN E1. The MFC-R2 trunk is controlled by DIP switches and the Command Line Interface (CLI) on the R2MFC MBM.

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For instructions to install, configure, and maintain the R2MFC MBM, see *R2MFC Media Bay Module Installation and Configuration Guide* (NN40010-300).

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BCM450 cable connection

This chapter describes how to connect the lines, extensions, and auxiliary equipment to your BCM450 system. It also describes how to connect the BCM450 system to a LAN.

BCM450 cable connection tasks

This work flow shows you the sequence of tasks you perform to install a main unit and expansion cabinet. To link to any tasks, go to BCM450 cable connection navigation.

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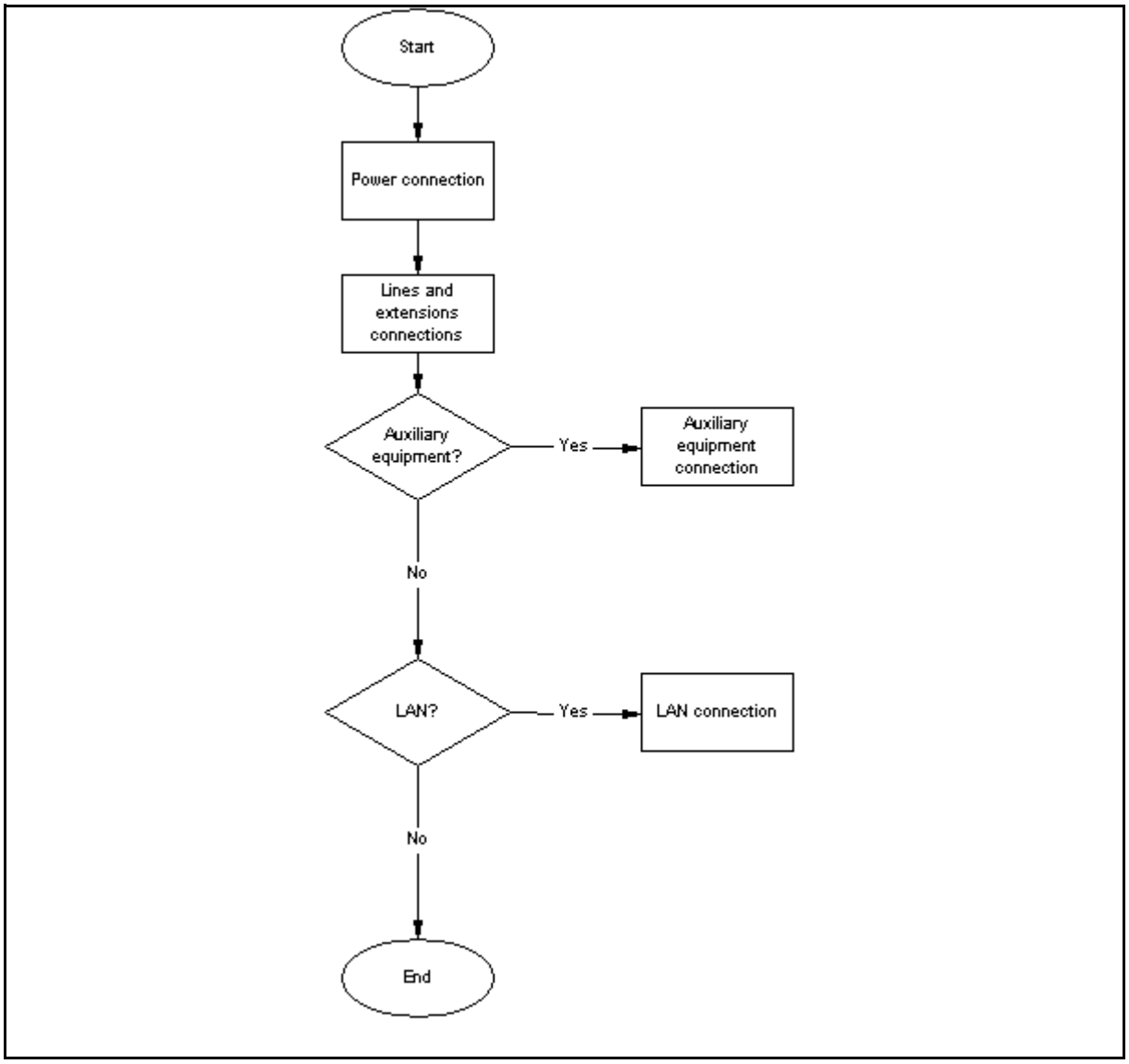
Figure 10 BCM450 cable connection tasks



BCM450 cable connection navigation

- Power connection (page 57)
- Lines and extensions connection (page 63)
- Auxiliary equipment connection (page 69)
- LAN connection (page 75)

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Power connection

The BCM main unit and expansion cabinet are each powered through an AC outlet. The voltage required depends on the geographical location of the units.

All systems are initially configured at the factory based on the intended destination. You must check that the voltage and wiring are correct for your system before you connect the units to the power source. Incorrect power settings result in equipment damage.

Read the following warnings. You must protect yourself and the BCM system from possible electrical shocks.

DANGER

Risk of injury from electric shock

Connect the ports on station modules only to approved digital telephones and peripherals with the proper cables on a protected internal wiring system.

CAUTION

Use only qualified persons to service the system

Service personnel with appropriate training and experience must perform the installation and service of this unit. Ensure service personnel are aware of the hazards of working with telephony equipment and wiring. They must have experience in techniques that minimize any danger of shock or equipment damage.

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CAUTION
Risk of equipment damage

Service personnel must be alert to the possibility of high leakage currents becoming available on metal system surfaces during power line fault events near network lines. These leakage currents normally safely flow to protective earth ground through the power cord.

System shutdown: You must disconnect the media bay module cables from the system before you disconnect the power cord from a grounded outlet.

System startup: You must reconnect the power cords to a grounded outlet before you reconnect the cables to the media bay modules.

Prerequisites to power connection

- Install the BCM450 main unit and optional expansion cabinet. For more information, see BCM450 main unit installation (page 25) and BCM450 expansion cabinet installation (page 37).

Power connection procedures

This task flow shows you the sequence of procedures you perform to connect power to your BCM450 system. To link to any procedure, go to Power supply installation navigation (page 59).

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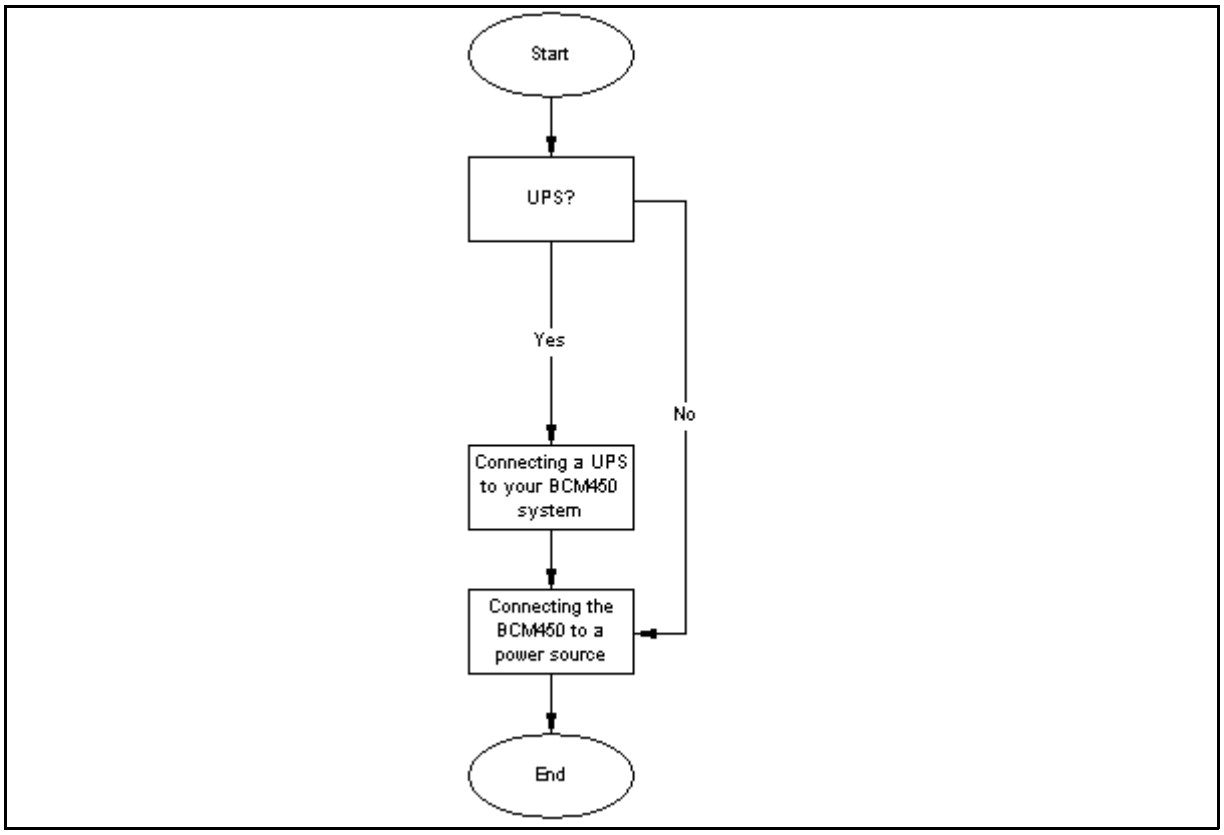
Figure 11 BCM450 power connection



Power supply installation navigation

- Connecting a UPS to your BCM450 system (page 60)
- Connecting the BCM450 system to a power source (page 60)

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Connecting a UPS to your BCM450 system

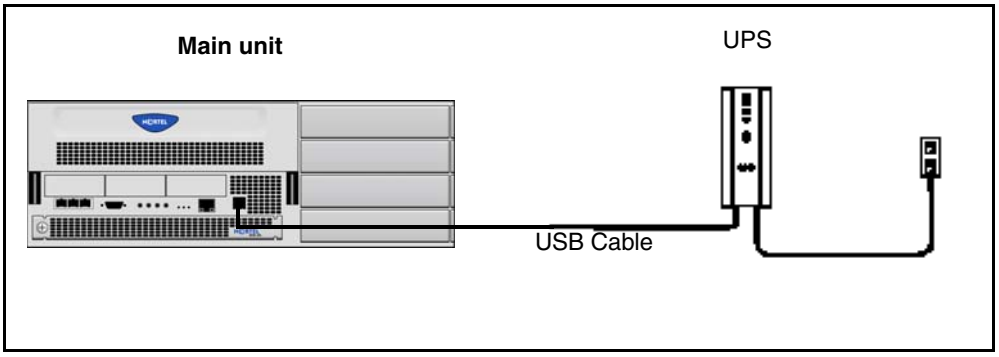
To obtain USB communication between an APC UPS and BCM450 a USB hub is not required. APC (American Power Conversion) is the only supported UPS vendor for BCM.

Prerequisites

- For the UPS to function correctly, you must connect it before you power up the BCM450 system. If you connect a UPS to a running system, the UPS does not function.
- International (non-North American) users require the power supply adapter cord to connect the power supply to the region specific power bar.
- Ensure the power supply is within 1.5 m (5 ft) of the BCM450 unit and within 1.5 m (5 ft) of the UPS.

Procedure steps

Step	Action
1	Plug one end of the USB cable into the USB port on the UPS.
2	Plug the other end of the USB cable into the top USB port on the BCM450 main unit. This ensures that the bottom port is left available for a USB storage device.
3	Plug the UPS power cord into the AC power source (wall outlet).



--End--

Connecting the BCM450 system to a power source

To power your BCM450 system, connect the main unit and expansion cabinet to an AC power source. You can connect the power supplies through a UPS or directly to the AC power source.

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Prerequisites

- Locate the supplied power cord the main unit and optional expansion cabinet.
- The power supply must be within 1.5 m (5 ft) of the BCM450 unit and within 1.5 m (5 ft) of the AC power outlet.

Procedure steps

Step	Action
1	Connect the BCM450 main or expansion cabinet power cord to a non-switchable, third-wire ground AC electrical outlet.
2	If you use a power bar, connect the power cord to the power bar and connect the power bar to the outlet.

--End--

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Lines and extensions connection

The telephone lines and extensions connect to the BCM450 main unit through an RJ-21 telephony connector on an MBM installed in the expansion cabinet.

Prerequisites to lines and extensions connection

DANGER

Risk of injury from electric shock

Connect the ports on station modules only to approved digital telephones and peripherals with the proper cables on a protected internal wiring system.

DANGER

Risk of injury from electric shock

Electrical shock hazards from the telecommunications network and AC mains can occur with this equipment. To minimize risk to service personnel and users, you must connect the BCM450 system to an outlet with a third-wire ground.

CAUTION

Use only qualified persons to service the system

Service personnel with appropriate training and experience must perform the installation and service of this unit. Ensure service personnel are aware of the hazards of working with telephony equipment and wiring. They must have experience in techniques that minimize any danger of shock or equipment damage

- You must connect the power cords to a grounded outlet before you connect the telephony and data networking cables.
- Do not connect Digital Station ports (DSM16+, DSM32+) and Analog Station ports (GASM8) to an exposed plant. This includes Digital Station ports that reside on the combination MBMs (G4x16 and G8x16). Use only proprietary Nortel Digital Station Sets to connect to digital ports and

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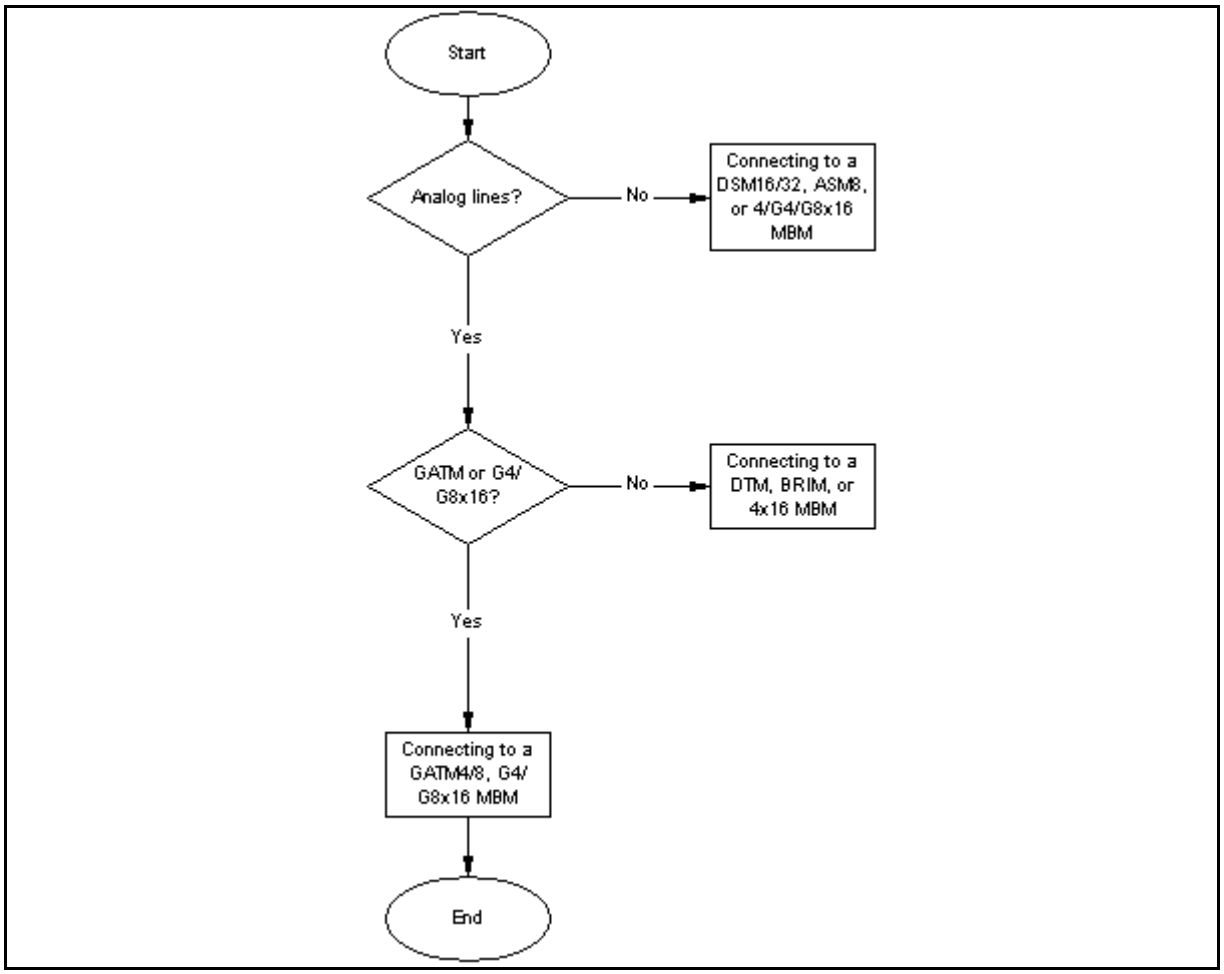
agency-approved Analog devices for connection to the Analog Station ports.

- Do not connect telephones to wiring that extends to the outside of the building.

Lines and extensions connection procedures

This task flow shows you the sequence of procedures you perform to connect the lines and extensions. To link to any procedure, go to Lines and extensions connection navigation.

Figure 12 Lines and extensions connection procedures



Lines and extensions connection navigation

- Connecting to GATM4/GATM8, and G4x16/8x16 MBMs (page 65)
- Connecting to DTM, BRIM, CTM, and 4x16 MBMs (page 65)
- Connecting to DSM16+, DSM32+, ASM8 MBMs (page 66)

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Connecting to GATM4/GATM8, and G4x16/8x16 MBMs

Analog telephone lines connect to your BCM450 system through the GATM4/GATM8, and G4x16/G8x16 CTM MBMs.

Prerequisites

- Obtain a 25-pair connector cable with an RJ-21 connector on one end.
- For detailed information about the wiring of the GATM4 or GATM8, see GATM wiring chart (page 134).
- For detailed information about the wiring of the G4x16 or G8x16 MBM, see G4x16 and G8x16 wiring chart (page 137).

Procedure steps

Step	Action
1	If you use the GATM4 or GATM8, plug the RJ-21 end of the connector cable into the RJ-21 connector on the front of the MBM. **OR** If you have the G4x16 or G8x16 MBM, plug the RJ-21 end of the connector cable into the lower RJ-21 connector on the front of the MBM.
2	If you use a straight RJ-21 connector, secure the RJ-21 connector to the MBM with the two supplied screws on the sides of the connector. **OR** If you use a right-angle RJ-21 connector, secure the RJ-21 connector to the MBM with the supplied screw on the left side of the connector and with the supplied cable tie on the right side of the connector to fasten the 25-pair cable to the anchor on the MBM.
3	Connect the other end of the connector cable to the telephone company demarcation blocks of the building.

--End--

Connecting to DTM, BRIM, CTM, and 4x16 MBMs

Connect telephone lines to your BCM450 system through the DTM, BRIM, and 4x16 MBMs.

Prerequisites

- If the network ISDN is a U-loop, you must connect the BRIM only to an NT1 provided by the service provider. The NT1 must provide a Telecommunication Network Voltage (TNV) to Safety Extra Low Voltage (SELV) barrier.
- Do not attempt to plug digital equipment into the auxiliary (AUX) jacks on the front of a 4x16 MBM.

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- Obtain a telephone cable that includes a modular plug that matches the MBM to which you want to connect:
  - — RJ-48C for DTM
  - — RJ-45 for BRIM
  - — RJ-11 for 4x16 and CTM

Procedure steps

Step	Action
1	Plug the modular cable into the jack in the front of the MBM. The 4x16 is connected using a 25-pair connector cable.
2	Connect the other end of the cable to the telephone company demarcation blocks of the building.
3	To connect additional analog lines to a 4x16 MBM or BRIM, repeat step 1 and step 2 for each line.

--End--

Connecting to DSM16+, DSM32+, ASM8 MBMs

You can connect telephones to your BCM450 system through the DSM16+, DSM32+, ASM8 MBMs.

Prerequisites

- Obtain a 25-pair connector cable with an RJ-21 connector on one end.
- Do not connect the digital station ports of the DSM16+, DSM32+, or combination MBMs to the PSTN. Only approved digital telephones or peripheral devices can connect to the DSM16+, DSM32+, and combination MBMs.

Attention: ASM8 does not support digital telephones.

Procedure steps

Step	Action
1	If you use the DSM16+, DSM32+, ASM8, or 4x16 MBM, plug the RJ-21 end of the connector cable into the RJ-21 connector on the front of the MBM.
2	If you use a straight RJ-21 connector, secure the RJ-21 connector to the MBM with the two supplied screws on the sides of the connector.

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OR

If you use a right-angle RJ-21 connector, secure the RJ-21 connector to the MBM with the supplied screw on the left side of the connector and with the supplied cable tie on the right side of the connector to fasten the 25-pair cable to the anchor on the MBM.

3 Connect the other end of the cable to the local connecting blocks.

4 If you connect extensions to a DSM32, repeat step 1 to step 2 for the second RJ-21 connector.

--End--

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Auxiliary equipment connection

The main unit includes connections for an auxiliary ringer, an external paging system, and a music source.

Prerequisites to auxiliary equipment connection

CAUTION
SELV warning
External equipment connected to the auxiliary ringer, page relay, page output, and music-on-hold interfaces must use safety extra low voltage (SELV). All four auxiliary interfaces use SELV, and the external equipment connected to these interfaces must use SELV, or you must use external line isolation units (LIU).

Auxiliary equipment connection procedures

This task flow shows you the sequence of procedures you perform to install auxiliary equipment to the BCM 450 main unit. To link to any procedure, go to Auxiliary equipment connection navigation.

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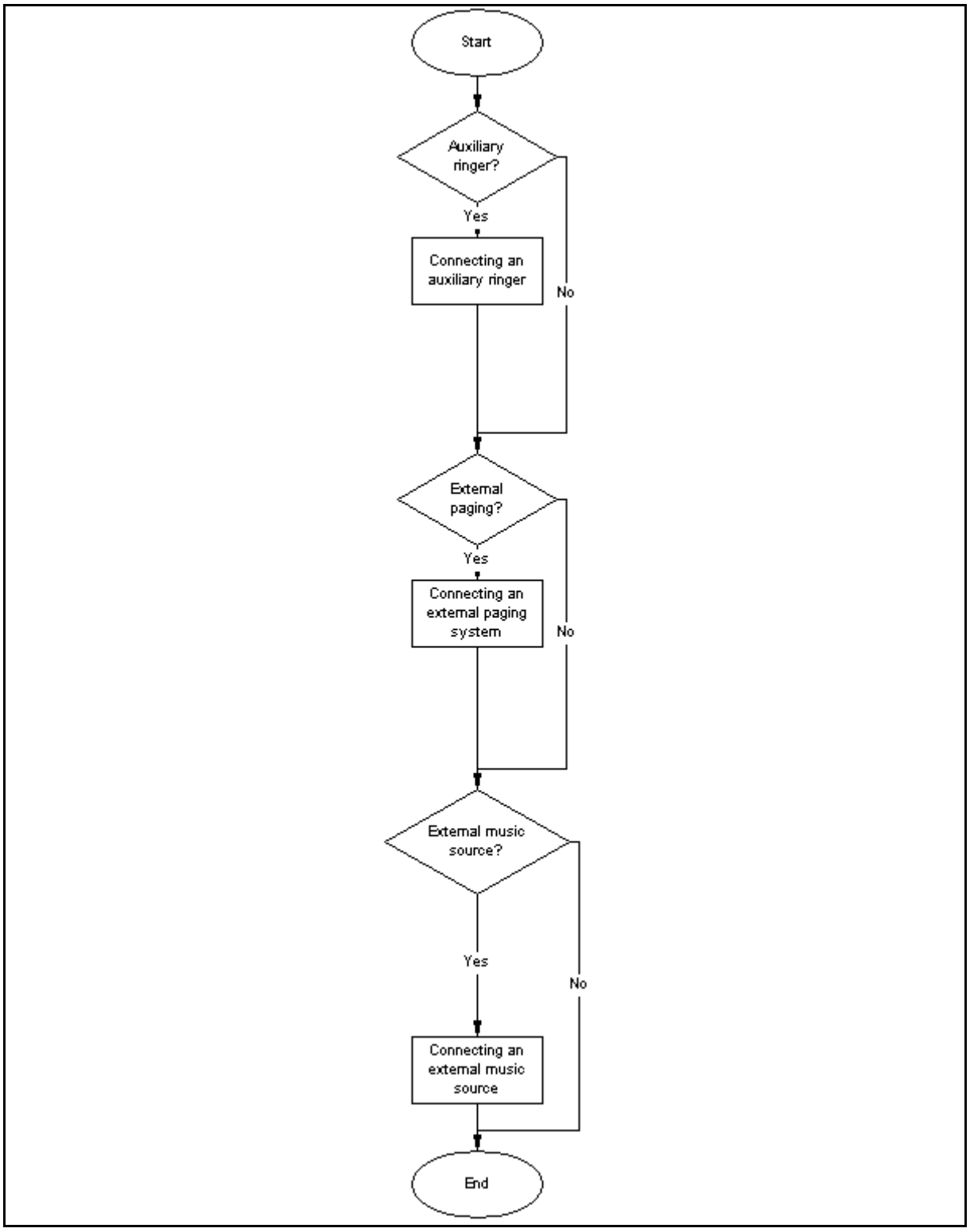
Figure 13 Auxiliary equipment connection procedures



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Auxiliary equipment connection navigation

- Connecting an auxiliary ringer (page 71)
- Connecting an external paging system (page 72)
- Connecting the music source using the music source jack (page 72)

Connecting an auxiliary ringer

An auxiliary ringer is a customer-supplied piece of hardware that provides external ringing capability to telephones on the BCM450 system.

Prerequisites

- You must not connect auxiliary ringer to unprotected plant wiring. The ringer must not draw more than 50 mA from a 40 V DC source.

Procedure steps

Step	Action
1	Install the auxiliary ringer using the installation instructions supplied with the ringer hardware.
2	Connect the ringer generator to the auxiliary ringer connection on the Base Function Tray.

--End--

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Connecting an external paging system

You can connect a customer-supplied external paging system to provide paging over external loudspeakers.

Prerequisites

- You must connect the paging connections to unprotected telephony plant wiring.
- External paging does not support talk back paging equipment unless you use an external line port. The BCM450 system provides paging over the telephone speakers when no external paging equipment is available.
- A Standard 1/8" Stereo mini jack is needed for the paging port on the Base Function Tray.
- Ensure the paging system follows these guidelines:
  - The paging output from the main unit is 100 mV rms across an input impedance of 600 Ω.
  - The output level is 0 dBm0 with reference to 600 ohms for a PCM encoded signal at 0 dBm. No DC voltage exists across the page output terminals. When you use the page signal output to connect an external paging amplifier, you also use the page relay output that contains a floating relay contact pair. The system uses this output to control the external paging amplifier.
  - The contact pair for the page relay output has a switch capacity of 50 mA (non inductive) at 40 V (maximum).

Procedure steps

Step	Action
1	Install the external paging hardware using the installation instructions supplied with the external paging system.
2	Connect the paging system audio input to the page output connection.
3	Connect the paging system relay to the page relay output connection.
4	Verify that the external paging system functions properly.

--End--

Connecting the music source using the music source jack

You can use a customer-supplied, low-power device as a music source. A music source includes equipment such as a radio with a high-impedance earphone jack.

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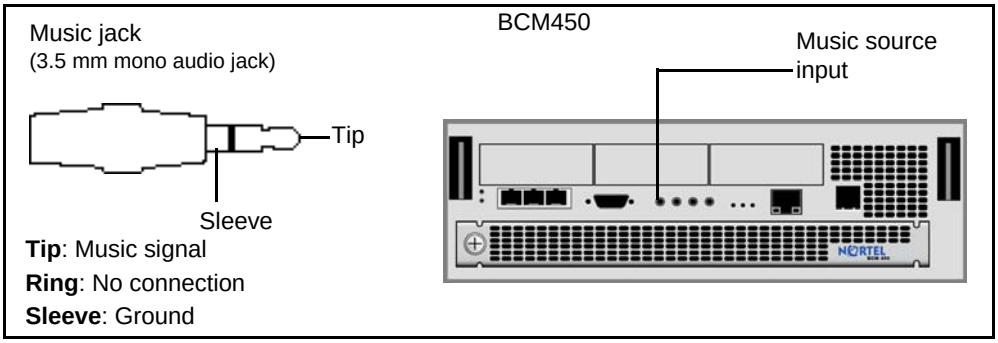
Prerequisites

- Ensure that the music source follows these guidelines:
  - — Nominal input impedance is 3.3 kilohms.
  - — Nominal sensitivity of this interface returned to digital encoded PCM is –22 dBm0 for a 0.25 V rms input signal.
  - — The input is limited so that the encoded analog content at the digital interface to the network does not exceed –12 dBm when averaged over a three-second interval.
  - — The maximum nonclipped input level is 1 V rms.
  - — The interface is protected against ringing cross.

Procedure steps

Step	Action
1	Connect the miniature jack of the music source output (3.5 mm mono audio jack) to the music source input on the BCM450 main unit.



2	Adjust the volume of the music source to an appropriate level by placing a call and placing it on hold, and then adjust the volume at the music source.

--End--

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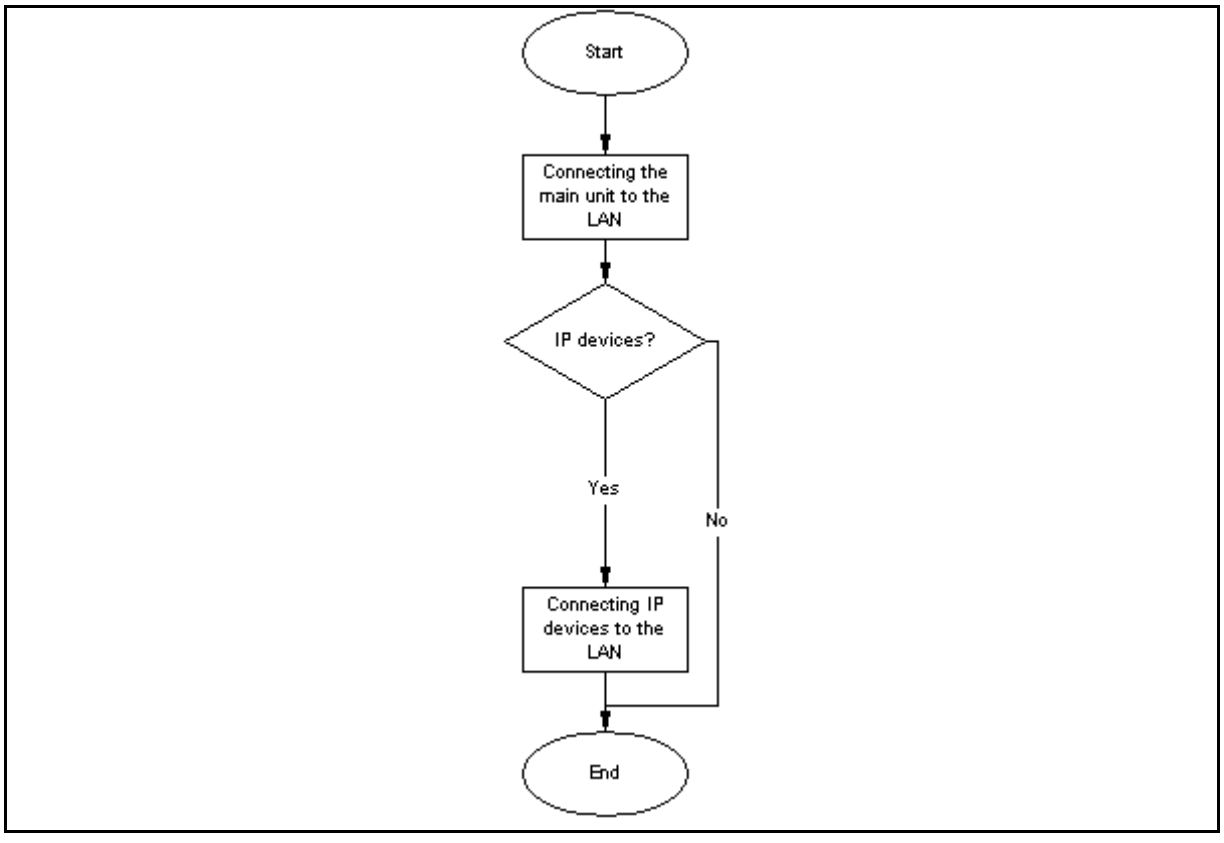
LAN connection

Connect the LAN cables to provide LAN access to your system and to enable connection of IP devices to the LAN through the BCM450 main unit.

LAN connection procedures

This task flow shows you the sequence of procedures you perform to connect your BCM450 system to the LAN. To link to any procedures, go to LAN connection navigation.

Figure 14 LAN connection procedures



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LAN connection navigation

- Connecting the main unit to the LAN (page 76)
- Connecting IP devices to the LAN (page 76)

Connecting the main unit to the LAN

Connect your BCM450 main unit to the LAN to enable LAN access for your system.

Prerequisites

- Obtain a standard Ethernet cable.
- The DHCP server on the main unit is enabled (IP Phones only) by default. If your network already contains a DHCP server, disable the DHCP server on the main unit.

Procedure steps

Step	Action
1	Connect one end of a standard Ethernet cable to your LAN.
2	Plug the other end of the Ethernet cable into one of the available two LAN ports on the BCM450 main unit (two right-most ethernet ports). The OAM port does not support VoIP devices.

--End--

Connecting IP devices to the LAN

Connect IP devices to the LAN to provide additional functionality to your BCM450 system.

Prerequisites

- Obtain a standard Ethernet cable for each IP device.
- A properly configured layer 2 switch in the network.

CAUTION

The two LAN ports on the BCM450 are set up in a bridge configuration (both ports use the same IP address). Do not connect IP devices to both ports at the same time to avoid service problems.

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Procedure steps

Step	Action
1	Connect one end of a standard Ethernet cable to an IP device.
2	Connect the other end of the Ethernet cable into one an available ports on the layer 2 switch.
3	Connect the switch to one of the available LAN ports.
4	Repeat step 1 and step 2 for each IP device you want to connect to the LAN.

--End--

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BCM450 telephone and peripheral installation

This chapter describes how to install and configure telephones and other peripheral devices for BCM450.

BCM450 telephone and peripheral installation navigation

- Telephone installation (page 81)
- Capacity expansion card installation (page 83)
- Analog terminal adapter installation (page 85)

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Telephone installation

This chapter describes how to connect telephones to your BCM450 system.

Prerequisites to telephone installation

- To operate the BCM450 expansion cabinet at the optimal internal temperature, ensure the top, sides, and rear clear of obstructions and away from the exhaust of other equipment.
- Ensure no objects are on top of the expansion cabinet.

Telephone installation navigation

- Installing an emergency telephone (page 81)
- IP phone installation (page 82)
- Mobility system installation (page 82)
- T7406e cordless telephone installation (page 82)

Installing an emergency telephone

You can use an emergency telephone to make calls when no power is going to the BCM450 system. You can connect an emergency telephone to every CTM/GATM installed in your BCM450 system.

Prerequisites

- A CTM/GATM MBM installed in your BCM450 system. For more information about installing MBMs, see MBM installation (page 43).
- A single line analog telephone is required.

Procedure steps

Step	Action
1	Connect a single line analog telephone to the auxiliary port on the CTM/GATM.
2	Connect an analog PSTN line cable to the line 1 port of the CTM/GATM.

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--End--

IP phone installation

Configure the system to automatically assign DNs to the Nortel IP Phones. If you choose to manually assign DNs, choose DNs from unused DNs in the digital range. However, port numbers are assigned from DS30 01 (ports 0101-0132) first; then from DS30 08, if ports are available, and DS30 07 if the system uses a 3/5 DS30 split. If no ports are available on those DS30 blocks, the system can assign digital set port numbers. Also, ensure that you do not assign DNs that are assigned to Call Center mailboxes (CDNs).

Mobility system installation

All radio-based mobility systems have documentation that describes the hardware and installation and activation of the handsets.

The BCM main unit can support a maximum of two digital mobility controllers (DMC), which are the call processing units between the BCM main unit and the digital mobility base stations and handsets. The DMCs have a one-to-one connection with digital ports on the BCM main unit.

For installation and configuration details, see the *Digital Mobility Installation and Configuration Guide* (N0000623).

T7406e cordless telephone installation

The T7406e cordless system consists of a base station that connects up to three digital station ports on the BCM450 system, that provide a radio interface for three cordless handsets. The cordless handsets register to the base station, which transfers the call over the telephone lines connected to the system. The handsets are configured to emulate the T7316/M7310 telephone features. This system is most suited for small- to medium-sized office environments that are set up in an open fashion.

For installation and configuration details, refer to the *T7406E Cordless Handset Installation and Configuration Guide* (NN40110-301).

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Capacity expansion card installation

This chapter describes how to install the optional capacity expansion card (CEC) into the BCM450 main unit. The CEC provides increased media processing capacity to support up to 300 stations and 130 trunks, as well as the associated increases in application capacity.

Installing the CEC

Use the following procedure to install the CEC in the main unit.

Prerequisites

- Power down the BCM450 system.
- You will require a Phillips head screwdriver.
- Ensure the BCM450 main unit is disconnected from the AC power source.

CAUTION
Risk of damage to equipment
You must wear an antistatic grounding strap at all times when handling electronic components. Failure to do so can result in damage to the equipment.

Step	Action
1	Power down the BCM 450 system and remove the base function tray.
2	Attach one end of a grounding strap to your wrist and the other end to a grounded metal surface.
3	Remove the plastic cap on the CEC slot on the front of the base function tray by applying pressure to the bottom of the faceplate from the inside of the Base Function tray. Once the bottom has come loose, remove the faceplate from the front.

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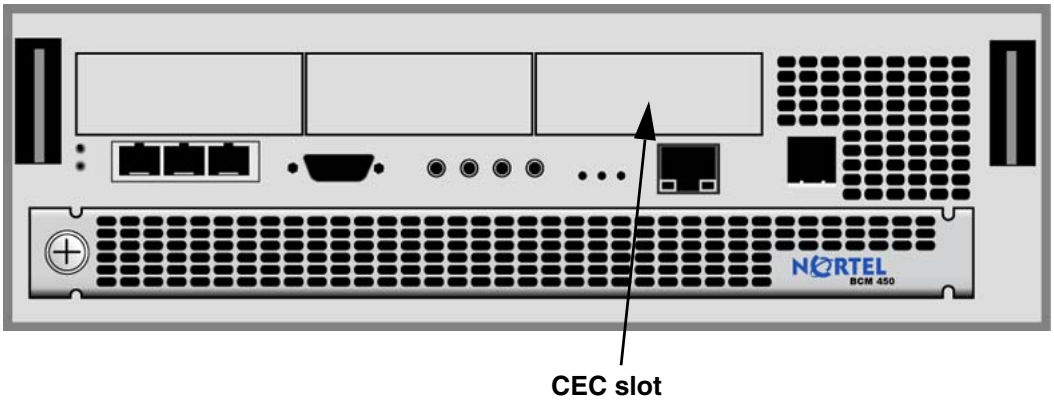
Figure 15 CEC slot



4 Screw the four metal standoffs (included) into the main board of the base function tray.

5 Slide the CEC into position from the back of the base function tray, so that the CEC protrudes slightly from the front faceplate of the base function tray.

6 Align the connectors on the card and on the main board of the base function tray and push down. Ensure that the card is connected securely to the main board.

7 Use the four supplied screws to fasten the card to the standoffs.

8 Reinstall the base function tray and power on the BCM450 system.

--End--

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Analog terminal adapter installation

This chapter describes how to install an analog terminal adapter (ATA) or ATA2 for the BCM450. You can use an ATA to connect a standard analog voice device or data communication device to the BCM system through a digital station module. Examples of analog voice devices include analog telephones and answering machines. Examples of data communication devices include modems and fax machines.

Prerequisites to ATA2 installation

- In North America, the ATA2 must be powered from a UL- and CSA-approved Class 2 power source.
- In Europe, the ATA2 must be powered from a Class II power source that is CE marked.

Analog terminal adapter installation procedures

This task flow shows you the sequence of procedures you perform to install an ATA2. To link to any procedures, go to Figure 16 Analog terminal adapter installation procedures (page 86).

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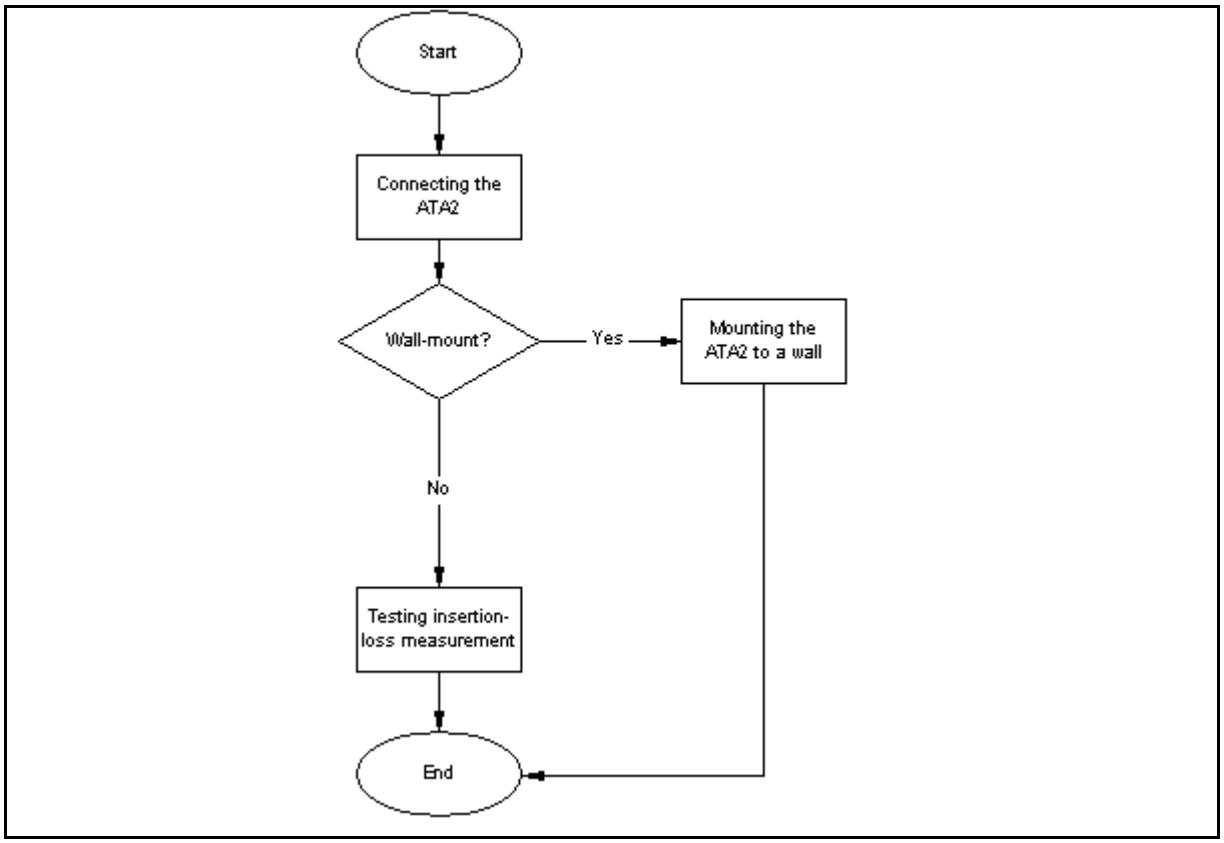
Figure 16 Analog terminal adapter installation procedures



Analog terminal adapter installation procedures navigation

- Connecting the ATA2 (page 86)
- Mounting the ATA2 to a wall (page 87)
- Testing insertion loss measurement from the CO to the analog device (page 88)
- Testing insertion loss measurement from the analog device to the CO (page 88)
- Configuring the ATA2 (page 89)

Connecting the ATA2

After you have set up the correct environment, connect the BCM system and the analog device to the ATA2, and then connect the power.

Prerequisites

- An available station port on the BCM450 system is required.

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Procedure steps

Step	Action
1	Connect one end of a line cord to the ATA2 terminal jack.
2	Connect the other of the line cord to your telephone, modem, or fax machine.
3	Connect one end of a line cord to the ATA2 line jack.
4	Connect the other end of the line cord to an available digital station port.
5	For a 120 V or 230 V system, plug the DIN connector of the power supply cord into the power supply connector receptacle.
6	Plug the adapter into a standard AC outlet.

--End--

Mounting the ATA2 to a wall

After you connect the ATA2, you can mount it on a wall.

Prerequisites

- You require 2 4-mm (#8) screws.
- When using 0.5mm wire (24 AWG), select a location within 800 m (2600 ft.) of the BCM450 main unit.
- Allow 12.5 cm (5 in.) clearance for the line jack, terminal jack, and power supply connector.

Procedure steps

Step	Action
1	Screw two 4-mm (#8) screws into the wall, 130 mm (5 1/4 in.) away from each other. Leave 6 mm (1/4 in.) of the two screws showing.
2	Align the slots at the back of the ATA2 unit over the screws. Push the unit against the wall. The line jack, terminal jack, and power supply connector must be at the top of the ATA2.

--End--

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Testing insertion loss measurement from the CO to the analog device

The maximum loss for ATA2 to Central Office (CO) configuration must not exceed 10 dB, and must be greater than —10 dB.

Measure the total insertion loss between the CO and analog device by using standard dial-up test lines with a transmission test set.

Prerequisites

- You will need a transmission test set (for example, Hewlett-Packard 4935A Transmission Test Set).

Procedure steps

Step	Action
1	Establish a connection to the 1 mW, 1 kHz, CO service line with an analog telephone connected to the ATA2.
2	Replace the analog telephone with the test set.
3	Use RECEIVE/600 OHM/HOLD mode on the test set.
4	Ensure that the analog port terminates correctly in 600 ohms.
5	Ensure that the test set connects in parallel to the service line before you remove the analog telephone or the line drops.
6	Remove the single-line telephone.
7	Measure the 1 kHz tone at the far end of the analog port, where the analog loop ends and the analog device connects.

--End--

Testing insertion loss measurement from the analog device to the CO

The maximum loss for ATA2 to Central Office (CO) configuration must not exceed 10 dB and must be greater than —10 dB.

Measure the total insertion loss between the CO and analog device by using standard dial-up test lines with a transmission test set.

Prerequisites

- You will need a transmission test set (for example, Hewlett-Packard 4935A Transmission Test Set).

Procedure steps

Step	Action

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1. Establish a connection to a silent termination on the CO service line with an analog telephone connected to the ATA2.
2. Replace the analog telephone with the test set.
3. Use RECEIVE/600 OHM/HOLD mode on the test set.
4. Ensure that the analog port terminates correctly in 600 ohms.
5. Ensure that the test set connects in parallel to the service line before you remove the analog telephone or the line drops.
6. Remove the single-line telephone.
7. Introduce a 1 kHz tone into the analog line at —10 dBm, and measure the level at the CO exchange.

--End--

Configuring the ATA2

Configure the ATA2 using Element Manager or Telset Administration. For detailed configuration information, see *Nortel Business Communications Manager 450 1.0 Configuration—Devices* (NN40160-500).

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Element Manager installation

This chapter describes how to install Element Manager for the BCM450.

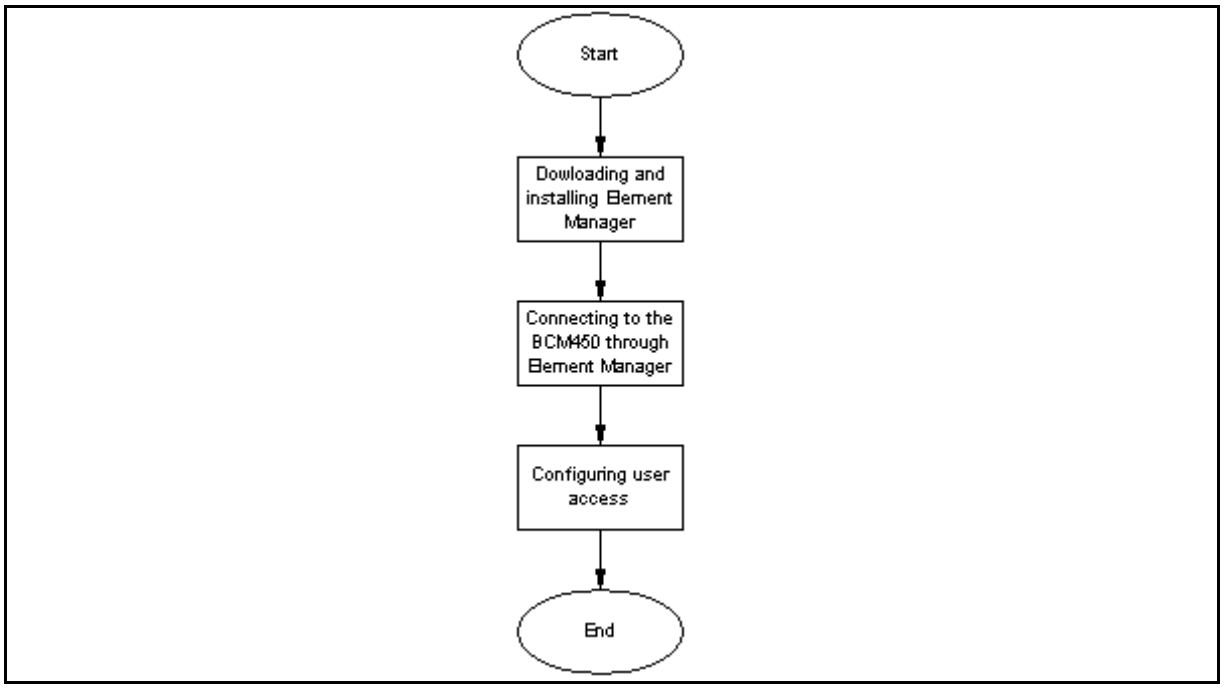
Prerequisites to Element Manager installation

- Ensure that the BCM450 is correctly installed, powered up, and connected to the network.

Element Manager installation procedures

This task flow shows you the sequence of procedures you perform to install Element Manager. To link to any procedures, go to Element Manager installation procedures navigation.

Figure 17 Element Manager installation procedures



Element Manager installation procedures navigation

- Downloading and installing Element Manager (page 92)
- Connecting to the BCM450 through Element Manager (page 93)

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- Configuring user access (page 93)

Downloading and installing Element Manager

After your computer connects to the BCM450 system, either through an Ethernet crossover cable or through a LAN connection, you can download BCM Element Manager from the Administrator Applications area of the BCM Web page. Use BCM Element Manager to connect to and configure your BCM450 system.

BCM applications for BCM450 support the following Vista versions: Microsoft Vista Business, Microsoft Vista Ultimate, and Microsoft Vista Enterprise. Both 32-bit and 64-bit versions of Windows Vista are supported except for the limitations identified in *Business Communications Manager 450— System Overview* (NN40160-103).

Prerequisites

- Element Manager is compatible with Windows 98SE, Windows 2000, Windows XP, and Windows Vista, Windows 2000 server, Windows Server 2003, and Windows Server 2008 operating systems.
- A minimum 256 MB of RAM is required; 512 MB of RAM is recommended.
- 150 MB of available hard disk space is required.
- BCM Element Manager access is also supported through a Citrix server.

Procedure steps

Step	Action
1	Open a Web browser and enter the BCM system IP address. The **Enter Network Password** dialog box appears.
2	Enter the user name and password (see the following for defaults): Username: nnadmin Password: PlsChgMe!
3	Click **OK**. The **Welcome to BCM** Web page appears.
4	On the Welcome to BCM Web page, click **Administrator Applications**. The **Administrator Applications** page appears.
5	On the **Administrator Applications** page, click **BCM Element Manager.** The **BCM Element Manager** pane appears.
6	Click **Download Element Manager** on the right side of the screen, and follow the instructions to download.

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7	After BCM Element Manager finishes downloading, double-click the application and follow the installation instructions.

--End--

Connecting to the BCM450 through Element Manager

After you install Element Manager on your PC, use it to connect to the BCM450 system.

Prerequisites

- Element Manager must be installed on your PC.
- Your BCM must be powered on and connected to the network, or connected directly to your PC through the OAM port or serial port.

Procedure steps

Step	Action
1	Open BCM Element Manager.
2	From the Network menu, select **New Network Element**, and then select **Business Communications Manager**.
3	Enter the BCM system IP address, the user name, and password (see the following for defaults): IP address: 192.168.2.2 Username: nnadmin Password: PlsChgMe!
4	Click **OK**. You are now connected to the BCM system. For more information about using BCM Element Manager, see the online Help within BCM Element Manager.

--End--

Configuring user access

After you have installed Element Manager and connected to the BCM450 system, you can create and configure user accounts for Element Manager.

Prerequisites

- Element Manager must be installed on your PC.

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- You must be logged on to Element Manager and have administrator access.

Procedure steps

Step	Action
1	From the **Configuration** tab, click the **Administrator Access** folder to expand it.
2	Select **Accounts and Privileges** from the **Administrator Access** folder.
3	Select the **View by Accounts** tab.
4	Click **Add...** to add a user account. The **Add Account** dialog box appears.
5	Configure the Add Account attributes.
6	Click **Ok**.
7	Repeat steps step 4 to step 6 to create more user accounts.

Table 1 Add account attributes

Attribute	Description
Description	Enter a description for this account.
User ID	Enter a descriptive name for the user or the user function.
Password	Enter a password for this account.
Telset user ID (numeric)	If the user performs administration through the Telset interface, enter a number for the user ID.
Telset password (numeric)	Enter a password for the Telset User ID.
Modem Callback Number	If Callback is required, enter the number to which the system calls back to verify the dial-up user access.
Modem Callback Passcode	This is the code the system uses to confirm the callback is legitimate.
ISDN Callback Number	If ISDN Callback is required, enter the number to which the system calls back to verify the dial-up user access.
ISDN Callback Passcode	This is the code the system uses to confirm that the ISDN callback is legitimate.
Change Password On Login	Select this check box to force the user to change the password upon first login.
Change Password On Login Telset	Select this check box to force the user to change the Telset password upon first log in.

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BCM450 common procedures

This chapter describes common procedures for the BCM450 system.

BCM450 common procedures navigation

- Rebooting the BCM450 (page 95)
- BCM450 shut-down (page 96)
- Installation troubleshooting (page 96)

Rebooting the BCM450

You can reboot the BCM450 system through Element Manager. For information to install Element Manager, see Element Manager installation (page 91).

Prerequisites

- Element Manager must be installed on a PC connected to the BCM450 system, either through the LAN, soft modem, ISDN, or directly through the OAM port.

Step	Action
1	Check for a recent backup of the BCM450 system programming.
2	If no recent backup is available, use Element Manager to back up the system data. For information about backing up the system data, see *Nortel Business Communication Manager 450 1.0—Administration and Security* (NN40160-601).
3	From the **Administration** tab, click the **Utilities** folder to expand it.
4	From the **Utilities** folder, select **Reset**.
5	Click **Reboot BCM450 System** to reboot the system.

--End--

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BCM450 shut-down

For information about shutting down an in-service BCM450 system, see *Business Communications Manager 450 1.0—Maintenance* (NN40160-503).

Installation troubleshooting

This section describes how to troubleshoot a BCM450 installation.

Checking LED status

You can use the status and power LEDs on the faceplate of the BCM450 base function tray to help troubleshoot hardware issues. For more information about system LEDs, see LED indicators reference (page 115).

Checking DIP switches

Problems also arise if you set the DIP switches on your installed MBMs incorrectly. For information about setting DIP switches, see MBM installation (page 43).

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Troubleshooting

This chapter describes how to troubleshoot the BCM450 system.

Troubleshooting navigation

- Testing the main unit (page 97)
- Troubleshooting the main unit (page 98)
- Determining why an MBM does not appear in Element Manager (page 99)
- Troubleshooting the FEM (page 100)
- Troubleshooting the ATA2 (page 100)
- Troubleshooting dial tone problems with the ATA2 (page 100)
- Checking ATA2 wiring (page 101)
- BCM450 system reset (page 101)

Testing the main unit

Use the following procedure to test the main unit.

Procedure steps

Step	Action
1	Go to an extension that is connected to the RJ-21 telephony connector on the main unit.
2	Check for a dial tone.
3	Use this extension to make a call to another extension on the system.
4	If this system is connected to an expansion cabinet with a media bay module (MBM) that supports extensions, repeat steps 2 and 3 for an extension connected to the expansion cabinet.
5	Go to an extension that has access to one of the lines on the main unit.
6	Select the line or line pool to which the line belongs.
7	Check for a dial tone.
8	Make a call using the line or line pool.

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9	If this system is connected to an expansion cabinet with an MBM that supports lines, repeat steps 6 to 8 with an extension that can access one of the lines connected to the expansion unit.

--End--

Troubleshooting the main unit

If a test fails, use the following procedure to troubleshoot the main unit.

Procedure steps

Step	Action
1	Verify that no nonfunctional features are included in your installed keycode.
2	Check the wiring to the main unit and to the MBMs. Make sure that the cables are properly seated and are connected to the correct ports.
3	Reboot the BCM450 system.
4	Check the LEDs.
5	Use Element Manager or the Telset Administration feature to check the programming for the lines or extensions that failed the call test.
6	If the programming is incorrect, use the Backup and Restore Utility to load a recent backup of system programming. If a recent backup is not available, correct the programming using Element Manager or the Telephone Administration feature.

--End--

Testing an MBM

Use the following procedure to test an MBM installed in the main unit or expansion cabinet.

If you are experiencing an issue with an FEM, ensure all DIP switches are set to the On position. For more information, see Fiber expansion module configuration (page 47).

Procedure steps

Step	Action
1	Check the Power and Status LEDs on the MBM. Both LEDs must be solid green. If either LED is not solid green, a problem exists with the MBM.

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2 Go to an extension on the MBM if it is a station MBM.

OR

Go to an extension that has access to one of the lines on the MBM if it is a trunk MBM. Select the line or line pool to which the line belongs.

3 Check for a dial tone.

4 Use this extension to make a call to another extension on the system if it is a station MBM.

OR

Make a call using the line or line pool if it is a trunk MBM.

5 Use this extension to make a call to an external telephone number if you are testing a station MBM.

--End--

Determining why an MBM does not appear in Element Manager

Use the following procedure if an installed MBM does not appear in Element Manager.

Procedure steps

Step	Action
1	Check that the correct feature is included in your installed keycode.
2	Check that both the Power and Status LEDs on the MBM are solid green.
3	If the Power LED is off, and the MBM is installed in the expansion cabinet, check that the power supply cable is properly seated in the expansion cabinet and the power supply is connected to a working power outlet.
4	Ensure that the MBM is properly seated in the MBM bay.
5	If the Status LED is not solid green, and the MBM is installed in the expansion cabinet, check that the Expansion cable is properly seated in the Expansion port on the expansion cabinet and on the main unit.
6	Ensure that the MBM is enabled using either Element Manager or Telset Administration. If the MBM is enabled, disable and re-enable it.
7	Ensure that all DIP switches are set correctly. For more information, see MBM installation (page 43).

--End--

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Troubleshooting the FEM

Use the following procedure to troubleshoot an installed fibre expansion module (FEM).

Procedure steps

Step	Action
1	Ensure that all six connector LEDs are lit.
2	If all six LEDs are not lit, ensure that all six DIP switches are set to the On (up) position. For more information, see Fiber expansion module configuration (page 47).

--End--

Troubleshooting the ATA2

Use the following procedure to troubleshoot a non-functioning ATA2.

Step	Action
1	Check for a dial tone using an analog device.
2	Check that AC power is connected to the ATA2 unit.
3	Check that the correct feature for digital sets is included in your installed keycode.
4	Verify that the ATA2 is connected to a digital station port.
5	Allow sufficient startup time (30–60 sec).
6	Plug an analog device into the phone port of the ATA2 and check for a dial-tone.

--End--

Troubleshooting dial tone problems with the ATA2

Use the following procedure if there is no dial tone on the ATA2

Step	Action
1	If you hear no dial tone, replace a single-line telephone for the data communication device.

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2	If you hear no dial tone at the ATA2 unit disconnect the line side of the ATA2.
3	Connect a digital telephone to the ATA2 port.
4	Check that the connection from the ATA2 to the BCM450 hardware works correctly.

--End--

Checking ATA2 wiring

If the problem with the ATA2 persists, use the following procedure to check the wiring.

Step	Action
1	Use an analog phone to test the ATA2.
2	Check the connection from the ATA2 to the terminal. The resistance must be 200 ohms or less for data applications and 1300 ohms or less for voice applications.
3	Check the connection from the BCM450 hardware to the ATA2.
4	Check that the connection from the ATA2 to the BCM450 hardware works correctly. The wiring must be equivalent to 800 m of 0.5 mm wire (2600 ft. of 24-AWG) or less. Do not use bridge taps and loading coils between the BCM450 hardware and ATA2.

--End--

BCM450 system reset

This section describes how to reset the BCM450 system using the reset switch. When the BCM450 is in this condition, you can make further modifications. After you reboot the BCM450, PC and SSH users will have access to Maintenance CLI.

See the following figure for the location of the reset switch.

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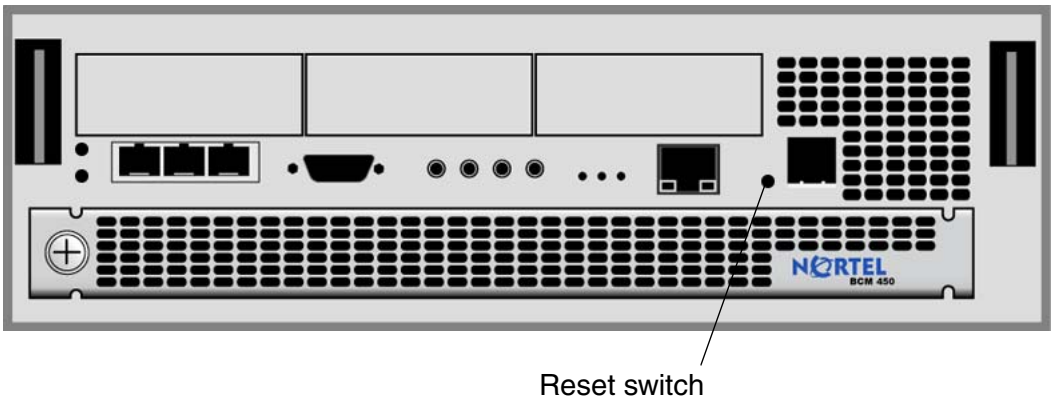
Figure 18 Reset switch location



If the reset button is pressed for less then 5 seconds, the BCM will begin the reboot process. The reboot is completed in less then 30 seconds.

If you hold the BCM450 Reset Button for 5 seconds or more, the BCM450 will immediately reboot. Data loss may occur. This should only be utilized when the BCM450 is not responding to normal reboot operations or is entirely non-responsive. If the BCM450 system has been shut down from the CLI, the BCM450 Reset Button must be held for 5 seconds to initiate the reboot process.

After the restart is completed, the BCM450 will wait up to 10 seconds for you to log onto the BCM Maintenance CLI. If you do not log onto the Maintenance CLI after 10 seconds, the BCM boots automatically to the Main OS.

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Preinstallation reference

Before you install your BCM450 system, you must ensure that your site and hardware meet the environmental, electrical, and site telephony requirements.

Navigation

- Environmental requirements
- Electrical requirements
- Site telephony wiring requirements

Environmental requirements

Your site must meet the following environmental requirements.

The installation area must be

- a minimum of 4 m (13 ft.) from equipment such as photocopiers, electrical motors, and other equipment that produces electromagnetic, radio frequency, and electrostatic interference
- within 1.5 m (5 ft.) of a three-wire grounded electrical outlet
- clean, dry, well ventilated, and free of traffic and excess dust
- within the temperature range of 5°C and 50°C (40°F and 120°F)
- from 20% to 80% noncondensing relative humidity
- structurally strong and with enough space to support the BCM450 units
- a minimum of 46 cm (18 in.) from the floor

Attention: The installation area must be of sufficient height from the floor to prevent water damage.

Electrical requirements

Your site must meet the following electrical requirements.

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- Power must be supplied from a nonswitched, unobstructed outlet within 1.5 m (5 ft.) of the BCM450 units.
- If you use a power bar, the total length of the power cables from the power supply to the electrical outlet (including power bar) must not exceed 2 m (6.5 ft.).
- The supplied power must be a dedicated 110 V to 120 V AC nominal (or 220 V to 240 V AC nominal), 50 to 60 Hz, 15 A minimum service with a third-wire safety ground. The third-wire safety ground provides shock protection and prevents electromagnetic interference.
- If you use a power bar, the power bar must be approved by an appropriate National Test Body, with a third-wire ground.
- Nortel recommends that you do not use an extension cord between the power supply and the power bar or between the power bar and the electrical outlet.

DANGER

Risk of electric shock

The safety of this product requires connection to an outlet with a third-wire ground. Use only with the supplied BCM450 power cord and a three-wire power outlet.

CAUTION

Check ground connection

Ensure that the electrical ground connections of the power utility, telephone lines, and internal metal water pipe system, if present, are connected. If these ground connections are not connected, contact the appropriate electrical inspection authority. Do not try to make the connections yourself.

Site telephony wiring requirements

The following sections describe the requirements for wiring digital telephony devices (digital loop) and analog telephony devices (analog loop) to the BCM450 system.

Digital loop

You must meet the following parameters for a digital loop:

- one, two, or three twisted-pair cables per telephone
- DC loop resistance of less than 64 Ω
- cable length (0.5 mm or 24-AWG) less than 300 m (975 ft.)
- use of a station auxiliary power supply (SAPS) for loops 300 m (975 ft.) to 1200 m (3900 ft.). In North America, the SAPS must be a CSA- or UL-

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approved Class 2 power source. In Europe, the SAPS must be a Class II power source and CE marked.

- no bridge taps

Analog loop

You must meet the following parameters for an analog loop.

- maximum DC loop resistance of 208 Ω
- maximum cable length (0.5 mm or 24-AWG) of 1220 m (4000 ft.)

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GASM DIP switch configuration

Before you install the GASM in the expansion cabinet or main unit, configure the DIP switches to the required positions.

GASM DIP switch configuration

Configure the Module Select DIP switches (on the left side at the rear of the GASM) to on (up), as shown in the following figure.

Configure the Mode/Country Select DIP switches on your GASM according to the following tables.

Figure 19 GASM DIP switch location

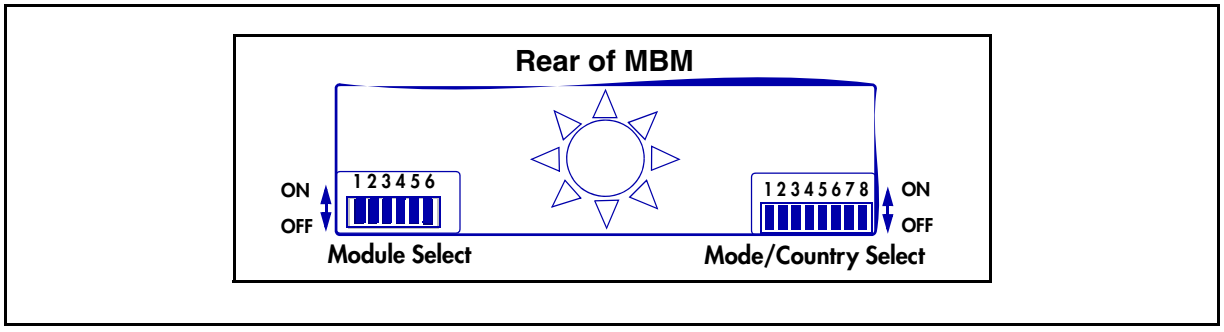

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Table 2 Mode Select DIP switches (switches 1–3) for the GASM

Switch	Description	Setting
Switch 1	Determines the firmware download capability.	OFF—Standard mode (firmware downloading not supported) ON—Enhanced mode (firmware downloading supported)
Switch 2	Determines when the firmware is downloaded from the BCM450 (for enhanced mode only).	OFF—if you want the GASM to download the firmware when the firmware version in the BCM450 is different from the version in the GASM (default) ON—if you want the GASM to download the firmware whenever a cold start occurs for the BCM450
Switch 3	Enables or disables echo cancellation	OFF—Enables echo cancellation (default) ON—Disables echo cancellation

Table 3 Country Select DIP switches (switches 4–8) for the GASM

	Switch 4	Switch 5	Switch 6	Switch 7	Switch 8
North America	OFF	OFF	OFF	OFF	OFF
United Kingdom	OFF	OFF	OFF	OFF	ON
Australia	OFF	OFF	OFF	ON	OFF
Poland	OFF	OFF	OFF	ON	ON

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Ports and connectors reference

The BCM450 main unit and BCM450 expansion cabinet have ports and connectors that provide functionality to your BCM450 system.

Navigation

- Main unit ports and connectors (page 109)

Main unit ports and connectors

This section describes the ports and connectors for the different BCM450 main units. Figure 18 illustrates the location of ports and connectors on the BCM450.

Figure 20 BCM450 main unit ports and connectors

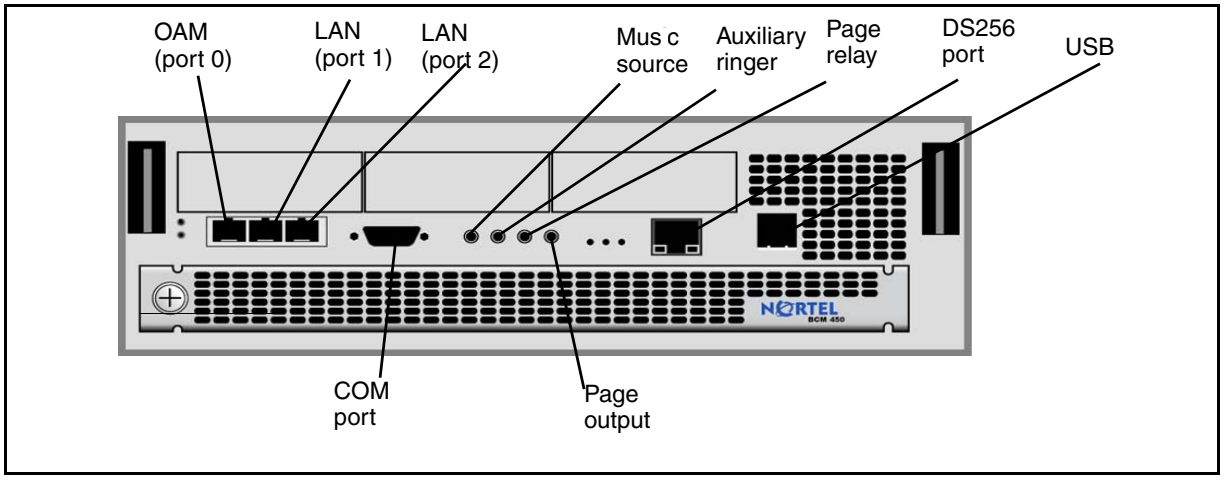

Table 4 describes the ports and connectors on the BCM450.

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Table 4 BCM450 main unit ports/connectors and descriptions

Port/connector	Description
OAM port (port 0)	An RJ-45 jack used to connect a computer running administration software, such as Element Manager, to the main unit.
LAN ports (port 1-2)	RJ-45 jacks used to connect the customer LAN to the main unit.
COM port (serial port)	Used to connect to the BCM450 system using a serial cable.
USB port	Two USB 2.0 ports used to connect a USB storage device (in the bottom port only) or the data interface for an uninterruptible power supply (UPS) to the main unit. The main unit uses the data interface for the UPS to monitor and control the UPS functions. You must format the USB storage device for the FAT32 file system. If necessary, reformat the USB storage device by plugging it into a USB port on your computer, right-clicking the USB device icon, and selecting FAT32 reformatting. This destroys any data on the USB.
DS256 jack	The BCM expansion cabinet connects to the BCM450 main unit through the DS256 jack on the faceplate. The DS256 cable to make this connection is provided with the purchase of a BCM expansion cabinet.
Auxiliary ringer jack	The BCM450 system uses the auxiliary ringer jack to control the cadence of an auxiliary ringer (customer supplied). You must use this output in a low current, low voltage application only. Do not use this output to directly switch the auxiliary ringer.
Page relay jack	If you use the page signal output jack to connect an external paging amplifier, you also use the page relay jack. The page relay jack connects a floating relay contact pair. The BCM450 system uses this jack to control the external paging amplifier.
Page output jack	The BCM450 system uses the page output to connect an internally generated voice paging signal to an external paging amplifier (customer supplied).
Music-on-hold jack	The BCM450 system uses the music-on-hold input to connect an external music source that supplies a signal to held lines (music-on-hold) or telephone speakers (background music). The input source can be any available radio or music source approved for connection to the network.

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Analog device specifications

This chapter provides a comparison of the specifications of the various analog devices available for a BCM450 system

ATA2, ASM8, ASM8+, GASM, and GASI analog device specifications

The following table shows the specifications for ATA2, ASM8, ASM8+, GASM, and GASI.

Table 5 ATA2, ASM8, ASM8+, GASM, and GASI analog device specifications (1 of 3)

Specification	ATA2	ASM8	ASM8+	GASM	GASI
Ringing frequency (North America)	20 Hz ± 1 Hz	20 Hz ± 1 Hz	20 Hz ±1 Hz	20 Hz ±1 Hz	20 Hz ±1 Hz
Ringing frequency (Europe)	25 Hz ± 1 Hz	25 Hz ± 1 Hz	25 Hz ± 1 Hz	25 Hz ± 1 Hz	25 Hz ± 1 Hz
Ringing voltage (North America)	80 V rms ± 10%	55 V rms ± 10%	65 V rms ± 10%	65 V rms ± 10%	65 V rms ± 10%
Ringing voltage (Europe)	75 V rms ± 10%	N/A	65 V rms ± 10%	65 V rms ± 10%	65 V rms ± 10%
Loop current	20 mA minimum	20 mA minimum	20 mA minimum	20 mA minimum	20 mA minimum
Battery feed voltage	–48 V dc ± 10%	–48 V dc ± 10%	–29 V dc ± 10%	–48 V dc ± 10%	–48 V dc ± 10%
FIC code	OL13ABC	N/A	N/A	N/A	N/A
Ringer equivalency number	3	1	2	2	2

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Table 5 ATA2, ASM8, ASM8+, GASM, and GASI analog device specifications (2 of 3)

Specification	ATA2	ASM8	ASM8+	GASM	GASI
ATA2 to BCM50 loop resistance (cable only)	135 ohms (800 m of 0.5-mm wire or 2600 ft of 24-AWG wire)	N/A	N/A	N/A	N/A
Analog loop resistance on terminal side for voice applications (cable only)	1300 ohms (7200 m of 0.5-mm wire or 26000 ft of 24-AWG wire)	250 ohms (1538 m of 0.5-mm wire or 5000 ft of 24-AWG wire)	200 ohms (1231 m of 0.5-mm wire or 4000 ft of 24-AWG wire)	200 ohms (1231 m of 0.5-mm wire or 4000 ft of 24-AWG wire)	200 ohms (1231 m of 0.5-mm wire or 4000 ft of 24-AWG wire)
Analog loop resistance on terminal side for data applications (cable only)	200 ohms (1231 m of 0.5-mm wire or 4000 ft of 24-AWG wire)	250 ohms (1538 m of 0.5-mm wire or 5000 ft of 24-AWG wire)	200 ohms (1231 m of 0.5-mm wire or 4000 ft of 24-AWG wire)	200 ohms (1231 m of 0.5-mm wire or 4000 ft of 24-AWG wire)	200 ohms (1231 m of 0.5-mm wire or 4000 ft of 24-AWG wire)
Input impedance at tip and ring	600 ohms	600 ohms	600 ohms	600 ohms	600 ohms
Return loss	> 20 dB for 200 to 3400 Hz (when terminated with 600 ohms)	> 20 dB for 200 to 3400 Hz (when terminated with 600 ohms)	> 20 dB for 200 to 3400 Hz (when terminated with 600 ohms)	> 20 dB for 200 to 3400 Hz (when terminated with 600 ohms)	> 20 dB for 200 to 3400 Hz (when terminated with 600 ohms)
Insertion loss on an internal call	ATA2 to BCM50 loss 3.0 dB ± 0.5 dB	ATA2 to BCM50 loss 3.0 dB ± 0.5 dB	ATA2 to BCM50 loss 3.0 dB ± 0.5 dB	ATA2 to BCM50 loss 3.0 dB ± 0.5 dB	ATA2 to BCM50 loss 3.0 dB ± 0.5 dB
Insertion loss on an external call	ATA2 to BCM50 loss 2.2 dB ± 1.0 dB; BCM50 to ATA2 loss 0.5 dB ± 1.0 dB	ASM to BCM50 loss 3.0 dB ± 1.0 dB; BCM50 to ASM loss 0.5 dB ± 1.0 dB	ASM to BCM50 loss 3.0 dB ± 1.0 dB; BCM50 to ASM loss 0.5 dB ± 1.0 dB	ASM to BCM50 loss 3.0 dB ± 1.0 dB; BCM50 to ASM loss 0.5 dB ± 1.0 dB	ASM to BCM50 loss 3.0 dB ± 1.0 dB; BCM50 to ASM loss 0.5 dB ± 1.0 dB

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Table 5 ATA2, ASM8, ASM8+, GASM, and GASI analog device specifications (3 of 3)

Specification	ATA2	ASM8	ASM8+	GASM	GASI
MWI type (see Note)	Stutter tone	Stutter tone	Stutter tone/ Voltage MWI (CO: 120 V)	Stutter tone/ Reverse polarity/ Voltage MWI (CO: 120 V)	Stutter Tone/ Reverse polarity/ Voltage MWI (PBX: 90 V)
Disconnect supervision types	N/A	N/A	OSI EIA/TIA 464 section 4.5.10.2.4/ 4.5.10.2.5.1	OSI EIA/TIA 464 section 4.5.10.2.4/ 4.5.10.2.5.1	N/A

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LED indicators reference

This chapter describes the BCM450 system LEDs including BCM450 main unit, expansion cabinet, and media bay module (MBM) LEDs.

Navigation

- System status monitor LEDs (page 115)
- Hard disk drive LEDs (page 117)
- LAN port LEDs (page 117)
- DTM LEDs (page 119)
- BRIM LEDs (page 121)

System status monitor LEDs

You can view the system status LEDs on the faceplate and on the top of the main unit.

see Figure 21 Location of system status LEDs on a main unit (page 116). For details, The bottom LED is the power LED, and the top LED is the status LED.

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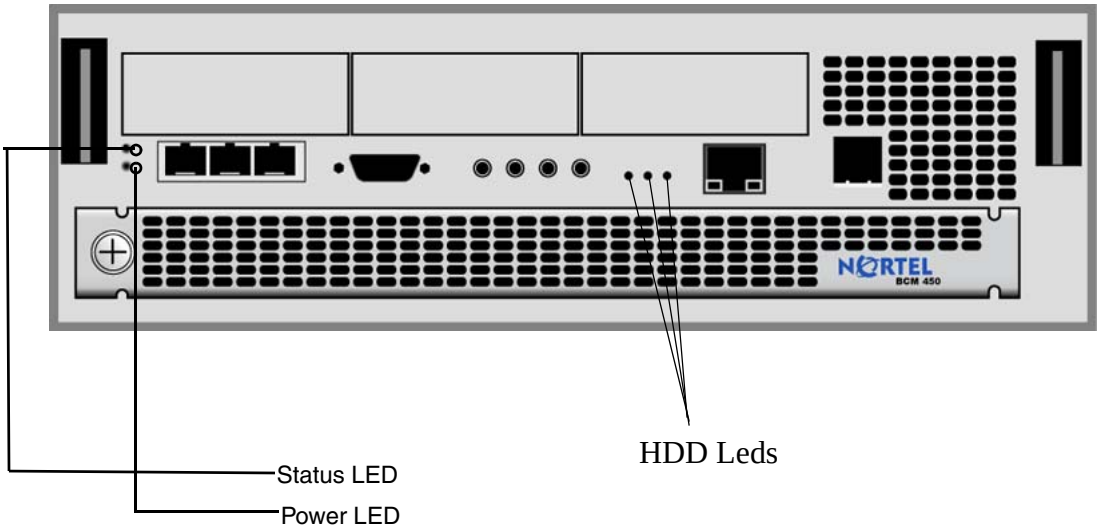
Figure 21 Location of system status LEDs on a main unit



For details about the meaning of the system status LEDs after the system boots up and is in service, see Table 6 System status LEDs states and descriptions. (page 116).

Table 6 System status LEDs states and descriptions.

Power	Status	Description
LED states seen during Start up sequence		
Solid yellow	Solid yellow	Power applied to system
Solid yellow	Off	Power on self test (POST). Lasts for 9 seconds.
Solid yellow	Solid yellow	System initializing (lasts 14 seconds).
Solid green	Solid yellow	Kernel initialization (lasts 8 seconds) or Safe OS.
Solid green	Blink green	Services initializing (lasts 1 minute).
Solid green	Solid green	Normal operation.
Solid green	Solid red	Services initialization failed.
LED states seen during Safe Mode start up sequence		
Solid red	Solid green	System running with factory default settings enabled.
Solid red	Solid red	System running in Software Reset mode.

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Power	Status	Description
Solid red	Blink yellow	System running in Configuration Reset mode.
LED states seen during shut down sequence or failure		
Solid green	Blink yellow	Graceful shutdown in progress.
Off	Solid yellow	Graceful shutdown completed.
Solid red	Blink yellow	Overheat detected. Thermal shutdown completed.
Solid red	Solid red	Power spike or Rail power fluctuation detected.
Blink red	Solid red	Rail power fluctuation. Power Monitor Shutdown completed.
Solid yellow	Solid red	Power spike shutdown completed (temperature and Rail power ok).
Off	Off	No power, system is shut down (power cable is disconnected).
LED states seen during initial system install or staging		
Blink Yellow	Blink Yellow	Start-up Profile executing
Solid Green	Solid Green	Start-Up Profile successfully applied
Blink Yellow	Blink Red	Start-Up Profile Failure

Hard disk drive LEDs

The following table describes the possible LED states for the hard disk drive LED.

Table 7 HDD LED states

LED	Description
Off	No HDD detected
Green	Normal operation
Red	HDD fault
Orange/Flashing Orange	Activity

LAN port LEDs

Each LAN port on the main unit has two LEDs. These LEDs indicate the status of the connection for that LAN port. For the location of the LEDs on the main units and expansion cabinet, see Figure 22 LAN port LEDs (page 118).

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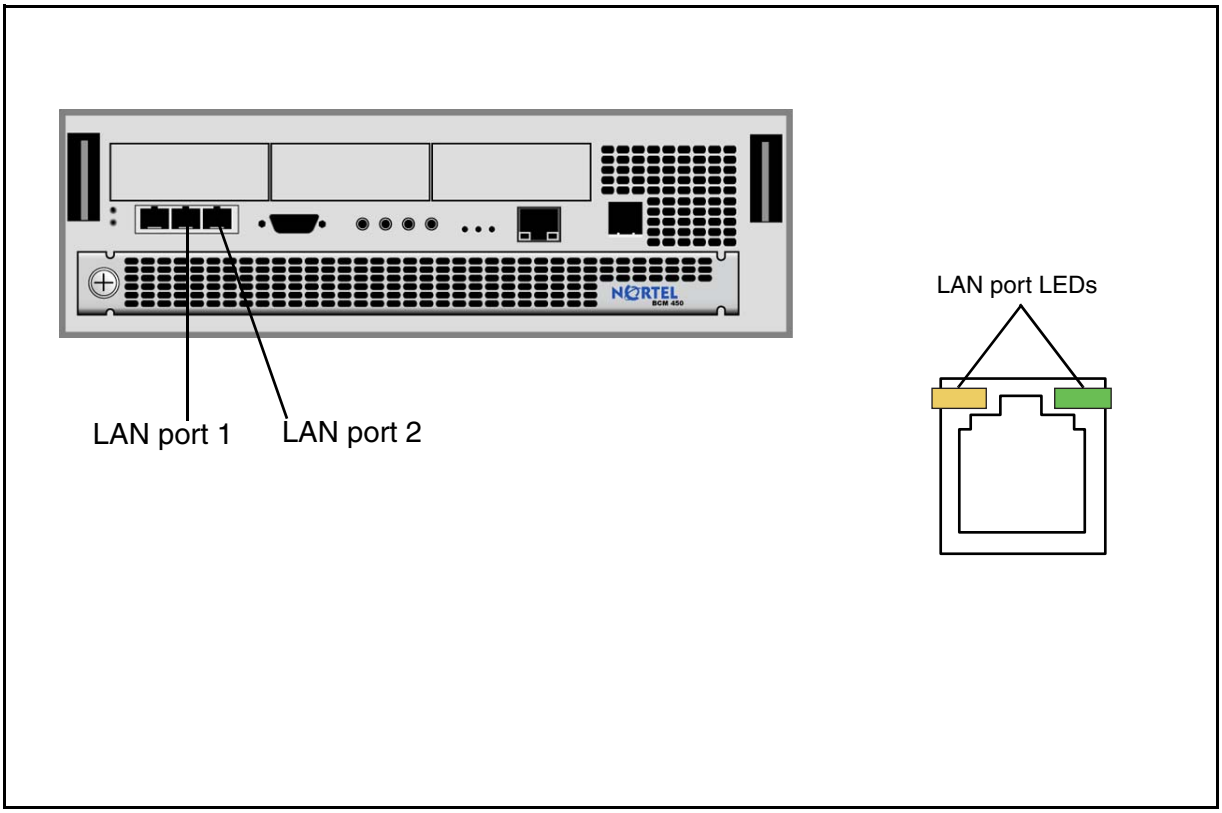
Figure 22 LAN port LEDs



For information about the possible LED states for the LAN ports LEDs, see Table 8 LAN port LEDs (page 118).

Table 8 LAN port LEDs

LED	Status	Description
Yellow	On	The LAN port is operating at 10 Mb/s.
Green	On	The LAN port is operating at 100 Mb/s.
Both LEDs	Off	No connection.
Any LED	Flashing	The LAN port is sending or receiving network data. The frequency of the flashes increases with increased traffic.

Media bay module LEDs

The two media bay module (MBM) LEDs on an expansion cabinet show the power and status of the MBM. For information about the location of the (Power) and (Status) LEDs on an MBM, see Figure 23 Media bay module LEDs (expansion cabinets only) (page 119).

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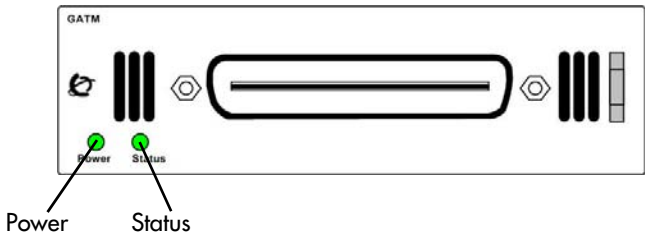
Figure 23 Media bay module LEDs (expansion cabinets only)



The power and status LEDs are in the same location on all MBMs. For information about the possible MBM LED states, see Table 9 Media bay module LEDs (expansion cabinets only) (page 119).

Table 9 Media bay module LEDs (expansion cabinets only)

Power	Status	Description
Off	Off	The MBM has no power, or a failure occurred on the MBM power converter.
On	Off	MBM failure or system initialization.
On	Blinking	Hardware is working, but an operational problem exists, such as • no link to the main unit is detected • frame alignment is lost on messages from the main unit • bandwidth not allocated • MBM is in maintenance state • MBM is in download state (GASM, GATM4/GATM8)
Blinking	Blinking	The MBM has power, but a hardware problem exists, such as • partial failure of power converter • thermal overload • fan failure

DTM LEDs

The DTM has additional LEDs that are not on most other MBMs. For information about the location of the DTM LEDs, see Figure 24 DTM LEDs (page 120).

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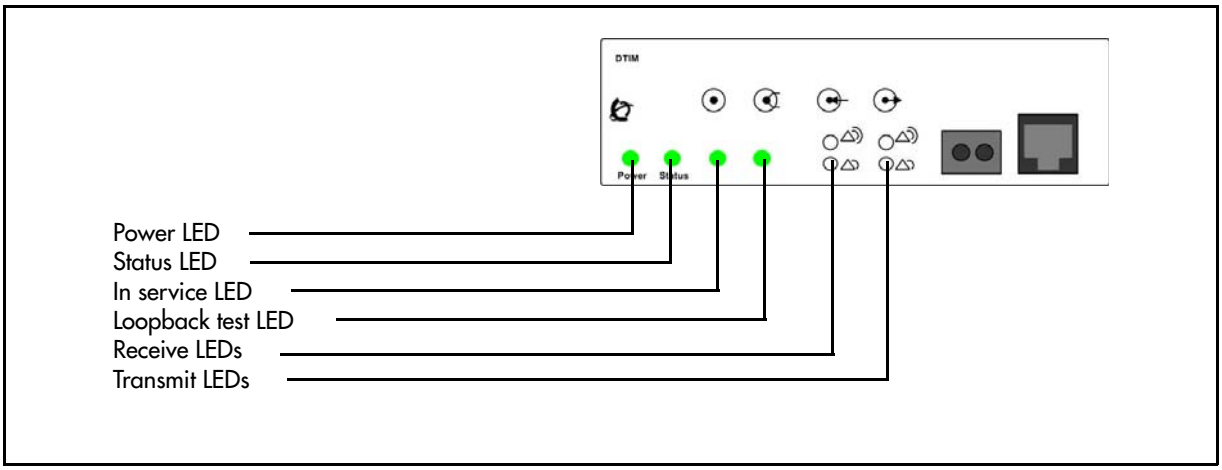
Figure 24 DTM LEDs



For information about the possible DTM LED states, see Table 10 DTM LEDs (page 120).

Table 10 DTM LEDs (1 of 2)

Power	Status	Description
Power	–	See Media bay module LEDs (page 118) for details.
Status	–	See Media bay module LEDs (page 118) for details.
In service	Flashing	The T1, ETSI, or PRI trunks are out of service because a loopback test is running or the DTM is initializing.
Loopback test	On	A continuity loopback test is running.
Receive alarm	On	A problem with the received digital transmission. This half-duplex link does not work.
Receive error	On	A small error as a result of degraded digital transmission. Possible causes are an ohmic connection, water ingress, or too long a loop.

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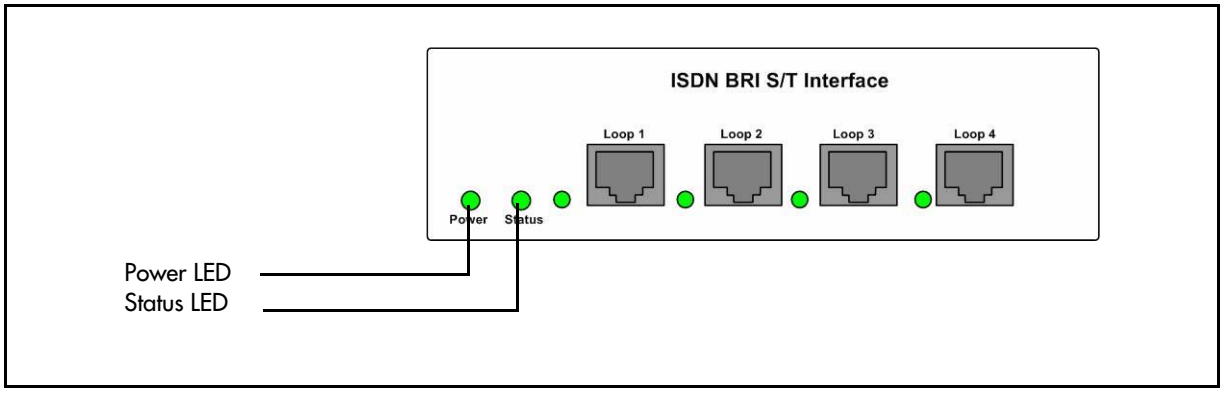
Table 10 DTM LEDs (2 of 2)

Power	Status	Description
Transmit alarm	On	The DTM cannot transmit. The DTM sends an alarm indication signal (AIS) to the terminating switch. This half-duplex link does not work.
Transmit error	On	The DTM is sending a remote alarm indication (RAI) carrier failure alarm (CFA) to the terminating switch. If the transmit alarm is not on, this error indicates a far-end or cable problem.

BRIM LEDs

The BRIM has one additional LED beside each RJ-48C jack. These LEDs are on if the ISDN line is active. For information about the location of the LEDs on a BRIM, see Figure 25 BRIM LEDs (page 121).

Figure 25 BRIM LEDs



For more information about the power and status LED functions, see Media bay module LEDs (page 118).

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System information and tools

Use the following information to prepare for your BCM450 hardware installation.

Navigation

- Media bay modules (page 123)
- Additional hardware (page 125)
- Tools (page 125)
- System information (page 126)

Media bay modules

Trunk media bay modules connect telecommunications lines to the BCM450 system. For a list of the types of trunk media bay modules that are available for the BCM450 system, see Table 11 Trunk MBMs (page 123).

Table 11 Trunk MBMs

Module type	Function	Notes
DTM (see Digital trunk media bay module on page 41)	Connects digital public switched telephone lines to the BCM450 1.0 system. Can connect to T1 or PRI-E1/T1 interfaces.	
BRIM (see Basic rate interface media bay module on page 42)	Connects a maximum of four ISDN BRI S/T interfaces.	—
GATM4/GATM8 (see Global Analog Trunk Module on page 42)	Connects either four (GATM4) or eight (GATM8) analog public switched telephone lines to the BCM450 1.0 system.	—

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Module type	Function	Notes
ADID4/ADID8 (see Analog direct inward dialing media bay module on page 43)	Connects either four (ADID4) or eight (ADID8) analog DID interfaces.	—
R2MFC	Provides MFC-R2 connectivity over an E1 trunk.	For details about the R2MFC MBM, see the *R2MFC Media Bay Module Installation and Configuration Guide* (NN40010-300).

Station MBMs connect telephones and analog telecommunication devices to the BCM450 system. For a list of the available station media bay modules, see Table 12 Station MBMs (page 124).

Table 12 Station MBMs (1 of 2)

Module type	Function	Notes
DSM16+/ DSM32+ (see Digital station media bay module on page 44)	Connects a maximum of 16 (DSM16+) or 32 (DSM32+) digital telephones to the BCM450 system.	—
4x16 Combination of a CTM4 and a DSM16 (see 4x16 media bay module on page 44)	Connects a maximum of four analog public switched telephone lines to the BCM450 system. Also connects a maximum of 16 digital telephones to the BCM450 system.	—
G4x16/G8x16 Combination of a GATM4/GATM8 and a DSM16 (see G4x16 and G8x16 media bay module on page 45)	Connects a maximum of four (G4x16) or eight (G8x16) analog public switched telephone lines to the BCM450 system. Also connects a maximum of 16 digital telephones to the BCM450 system.	—

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Table 12 Station MBMs (2 of 2)

Module type	Function	Notes
GASM (ASM8) (see Analog station media bay modules on page 45)	Connects a maximum of eight analog devices to the BCM450 system. This module provides the following additional services: caller ID, pass through, message waiting indication, and disconnect supervision at the telephone. This module downloads new firmware.	—

Additional hardware

In addition to the main unit, expansion cabinet, and MBMs, the BCM450 system includes the additional hardware listed in the following table.

Table 13 Additional hardware descriptions

Hardware	Description
Wall-mount bracket	A bracket designed to mount a BCM450 unit (main unit or expansion cabinet) to a wall.
Uninterruptible power supply (UPS) (if applicable)	An uninterruptible power supply (UPS) is an optional device that maintains continuous operation during power interruption or failure conditions. The UPS provides power-source monitoring and battery-backup activation to maintain critical BCM450 functionality. BCM450 supports American Power Conversion (APC) UPS devices that use a USB control interface. The UPS control software configures various operational settings.

Tools

Use the following table to view and record the tools required for your BCM450 installation.

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Table 14 Tools

Description
Laptop (or PC) with: • Windows 2000, Windows XP, or Windows Vista • minimum 256 MB, recommended 512 MB • 150 MB free disk space
Mounting hardware
rack-mount brackets, wall-mount bracket, or rubber feet; an optional plywood backboard 3/4 in. (2 cm) thick for wall-mount installations
Phillips #2 screwdriver
Common screwdriver
Pliers
Antistatic ground strap
Connecting tool
25-pair cable with RJ-21 connector
Cat 5 Ethernet cable with RJ-45 connectors
Surge protector

System information

Use the following table to view and record the system information for your BCM450 installation.

Table 15 System information (1 of 2)

Description
System name
Date and Time (NTP/Trunk/Manual)
Time zone
Initial IP address and netmask the network interface
Default next-hop router (default gateway)
DHCP server
DNS domain name

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Table 15 System information (2 of 2)

Description
Primary (and optional secondary) DNS servers IP
Profile/region
Telephony Startup template (DID/PBX)
Start DN

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Default values reference

Use the following tables to view default values for your BCM450 system and to record the new values.

Navigation

- Default user names and passwords (page 129)

Default user names and passwords

Use the following table to view and record changes to the default user names and passwords.

Table 16 Default user names and passwords

Tool	User ID | User name	Password	New password
Element Manager	nnadmin	PlsChgMe!	
BCM450 Web page (http:// [IP address])	nnadmin	PlsChgMe!	
Telset Administration (F9*8 and F**Config)	SETNNA (738662)	CONFIG (266344)	
Telset Administration voice mail (Feature 983)	SETNNA (738662)	CONFIG (266344)	
Telset Administration initialize voice mail (Feature 983)	–	CONFIG (266344)	

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Wiring charts reference

This chapter provides the wiring information for the BCM450 system connectors and ports.

Navigation

- DTM wiring chart (page 131)
- BRIM wiring chart (page 132)
- ADID wiring chart (page 133)
- GATM wiring chart (page 134)
- 4x16 wiring chart (page 137)
- G4x16 and G8x16 wiring chart (page 137)
- DSM16 and DSM32 wiring chart (page 138)
- ASM8, ASM8+, and GASM wiring chart (page 139)

DTM wiring chart

The digital telephone line connects to the Digital Trunk Module (DTM) through the RJ-48c jack on the front of the media bay module (MBM). For a view of the DTM ports, see Figure 26 DTM RJ-48C port (page 132).

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Figure 26 DTM RJ-48C port

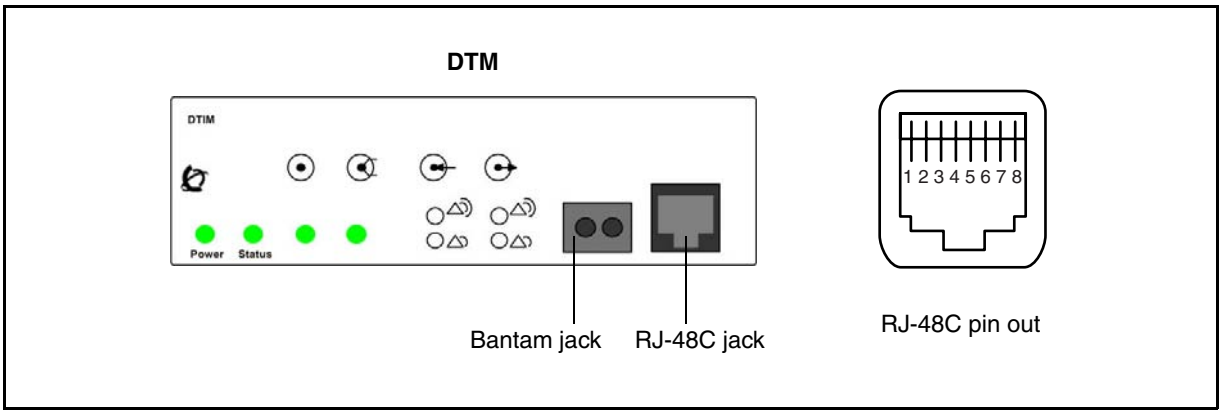

Table 17 DTM RJ-48c port wiring

Pin	Signal
1	Receive Ring
2	Receive Tip
3	Receive Shield
4	Transmit Ring
5	Transmit Tip
6	Transmit Shield
7	No connection
8	No connection

BRIM wiring chart

The digital BRI ISDN lines connects to the BRIM through the RJ-45 jacks on the front of the media bay module (MBM). For a view of the BRIM ports, see Figure 27 BRIM RJ-45 ports (page 133).

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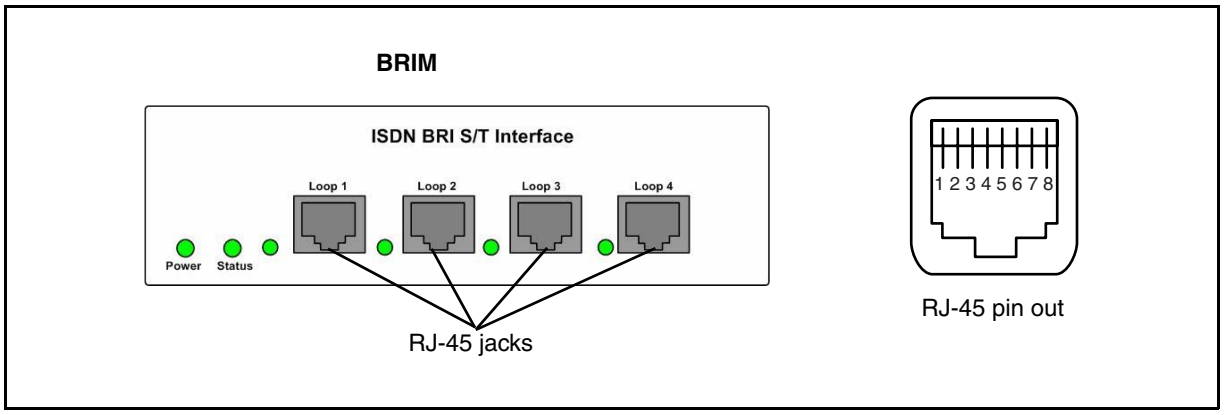
Figure 27 BRIM RJ-45 ports



Attention: For a U-loop connection, you must connect the BRIM only to an NT1 supplied by the service provider. The NT1 must provide a Telecommunication Network Voltage (TNV) to Safety Extra Low Voltage (SELV) barrier.

Table 18 BRIM RJ-45 port wiring

Pin	Signal	Signal on system side
1	No connection	No connection
2	No connection	No connection
3	+ Receive (+Rx)	+Tx
4	+ Transmit (+Tx)	+Rx
5	– Transmit (-Tx)	– Rx
6	– Receive (-Rx)	– Tx
7	No connection	No connection
8	No connection	No connection

ADID wiring chart

Analog telephone lines connect to the ADID4 or ADID8 through the RJ-21 connector on the front of the media bay module (MBM). To view the ADID connector, Figure 28 ADID RJ-21 connector (page 134).

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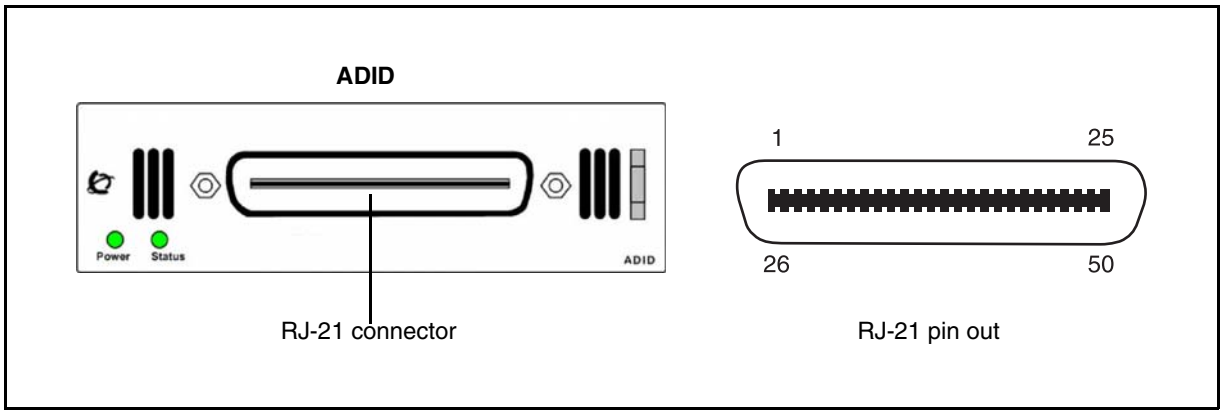
Figure 28 ADID RJ-21 connector



GATM wiring chart

Analog telephone lines connect to the GATM4 or GATM8 through the RJ-21 connector on the front of the media bay module (MBM). To view the GATM MBM, see Figure 29 GATM RJ-21 connector (page 134).

Figure 29 GATM RJ-21 connector

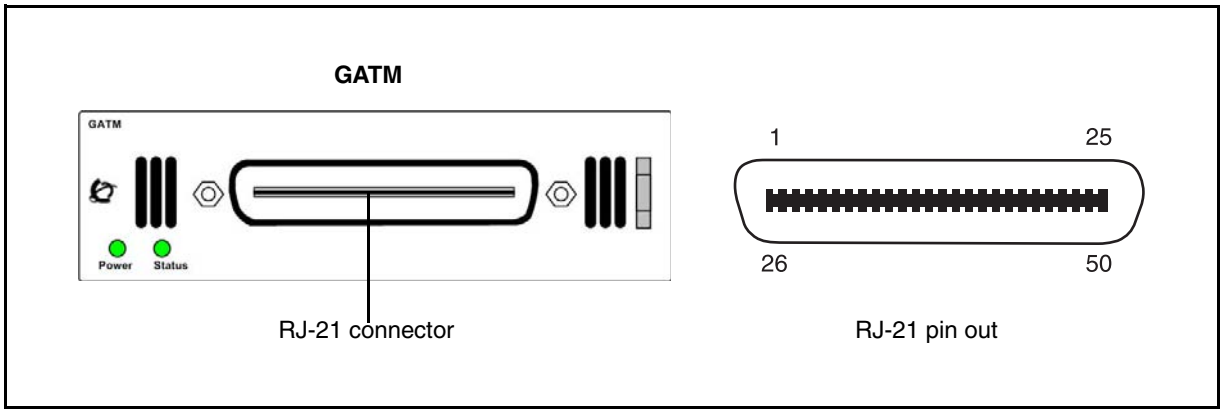


Table 19 GATM4 RJ-21 connector wiring (page 134) lists the wiring details for the RJ-21 connector on the GATM4.

Table 19 GATM4 RJ-21 connector wiring

Line	Pin	Connection	Wire color
1	26	Tip	White-Blue
	1	Ring	Blue-White
2	27	Tip	White-Orange
	2	Ring	Orange-White
—	28	No connection	White-Green
	3	No connection	Green-White

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Table 19 GATM4 RJ-21 connector wiring

Line	Pin	Connection	Wire color
—	29	No connection	White-Brown
	4	No connection	Brown-White
3	30	Tip	White-Slate
	5	Ring	Slate-White
4	31	Tip	Red-Blue
	6	Ring	Blue-Red
—	32	No Connection	Red-Orange
	7	No Connection	Orange-Red
.	.	.	.
.	.	.	.
.	.	.	.
—	49	No Connection	Violet-Brown
	24	No Connection	Brown-Violet
Aux	50	Tip	Violet-Slate
	25	Ring	Slate-Violet
Note: The Aux port supports full data speeds. When the line is in use by an analog device, the icon is lit on the phone to indicate it is in use. If you try to seize the line using the phone, the display shows “in use.” Also, in the event of a power failure, an analog set on line 1 goes active (powered by the CO).			

Table 20 GATM8 RJ-21 connector wiring (page 135) lists the wiring details for the RJ-21 connector on the GATM8.

Table 20 GATM8 RJ-21 connector wiring

Line	Pin	Connection	Wire color
1	26	Tip	White-Blue
	1	Ring	Blue-White
2	27	Tip	White-Orange
	2	Ring	Orange-White
—	28	No connection	White-Green
	3	No connection	Green-White

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Line	Pin	Connection	Wire color
—	29	No connection	White-Brown
	4	No connection	Brown-White
3	30	Tip	White-Slate
	5	Ring	Slate-White
4	31	Tip	Red-Blue
	6	Ring	Blue-Red
—	32	No connection	Red-Orange
	7	No connection	Orange-Red
—	33	No connection	Red-Green
	8	No connection	Green-Red
5	34	Tip	Red-Brown
	9	Ring	Brown-Red
6	35	Tip	Red-Slate
	10	Ring	Slate-Red
—	36	No connection	Black-Blue
	11	No connection	Blue-Black
—	37	No connection	Black-Orange
	12	No connection	Orange-Black
7	38	Tip	Black-Green
	13	Ring	Green-Black
8	39	Tip	Black-Green
	14	Ring	Green-Black
—	40	No connection	Black-Slate
	15	No connection	Slate-Black
.	.	.	.
.	.	.	.
.	.	.	.
—	49	No Connection	Violet-Brown
	24	No Connection	Brown-Violet

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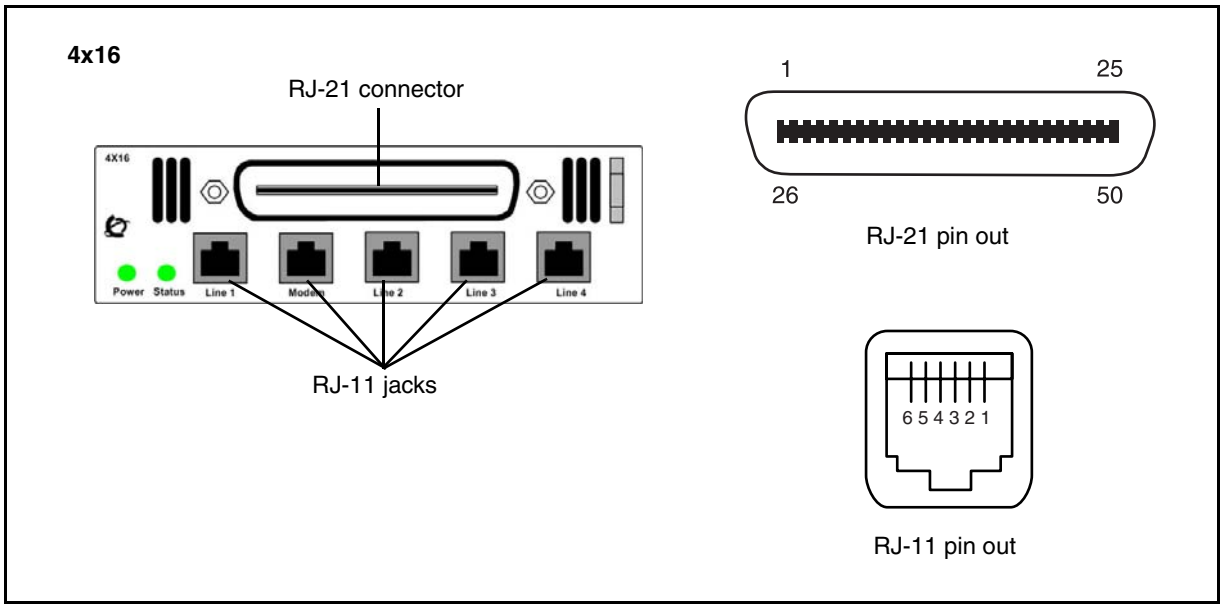
Line	Pin	Connection	Wire color
Aux	50	Tip	Violet-Slate
	25	Ring	Slate-Violet

Note: The Aux port supports full data speeds. When the line is in use by an analog device, the icon is lit on the phone to indicate it is in use. If you try to seize the line using the phone, the display shows “in use.” Also, in the event of a power failure, an analog set on line 1 goes active (powered by the CO).

4x16 wiring chart

The analog telephones lines connect to the 4x16 through the RJ-11 jacks (labeled 1 to 4) on the front of the MBM. Do not connect analog telephone lines to the auxiliary jack on the front of the media bay module. These jacks are intended for analog telephones designated as emergency telephones. To view the 4x16 connectors, see Figure 30 4x16 connectors (page 137).

Figure 30 4x16 connectors



G4x16 and G8x16 wiring chart

You can connect 4 or 8 analog telephone lines and up to 16 digital telephones to the G4x16 or G8x16 media bay module (MBM).

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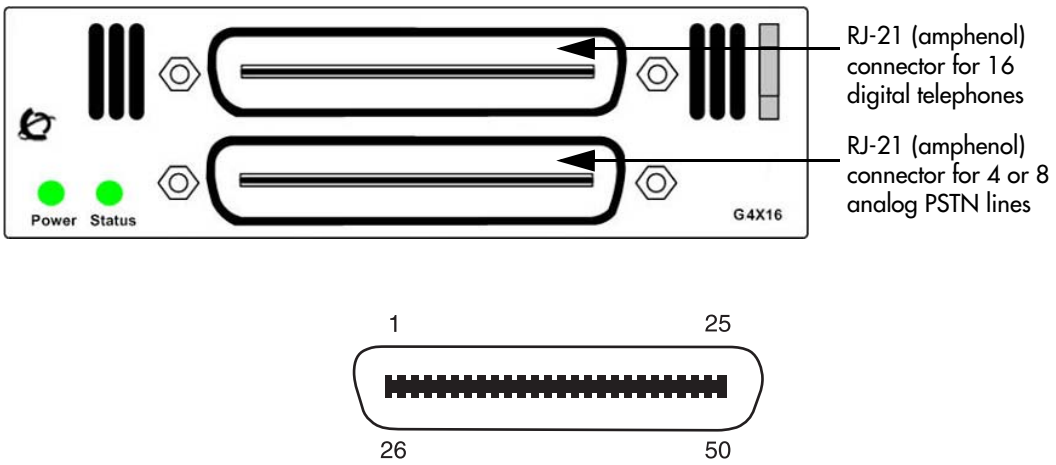
The analog telephones lines connect to the G4x16 or G8x16 through the lower RJ-21 (amphenol) connector on the front of the MBM. To view the G4x16/ G8x16 connectors, see Figure 31 G4x16/G8x16 connectors (page 138).

Figure 31 G4x16/G8x16 connectors



The digital telephones, such as the Business Series Telephones, connect to the upper RJ-21 (amphenol) connector on the front of the G4x16 or G8x16 MBM.

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DSM16 and DSM32 wiring chart

Digital telephones, such as the Business Series Telephones, connect to the Digital Station Module (DSM16 or DSM32) through the RJ-21 connectors on the front of the media bay module. The DSM16 has a single RJ-21 connector and the DSM32 has two RJ-21 connectors. To view the DSM16 and DSM32 connectors, see Figure 32 DSM16 and DSM32 RJ-21 connectors (page 139).

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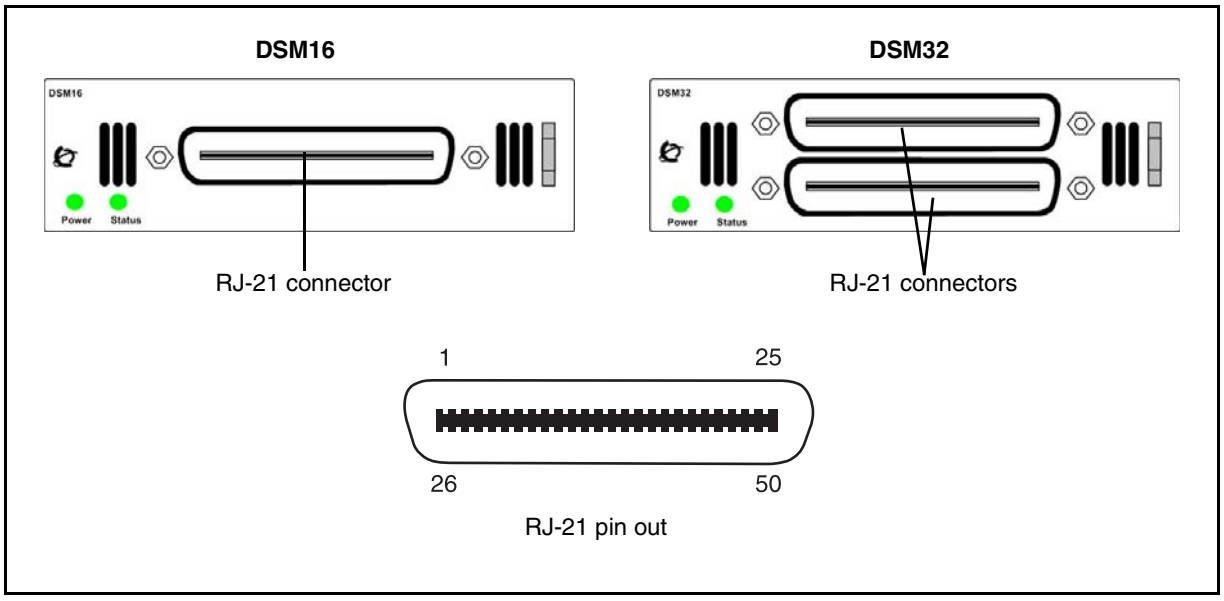
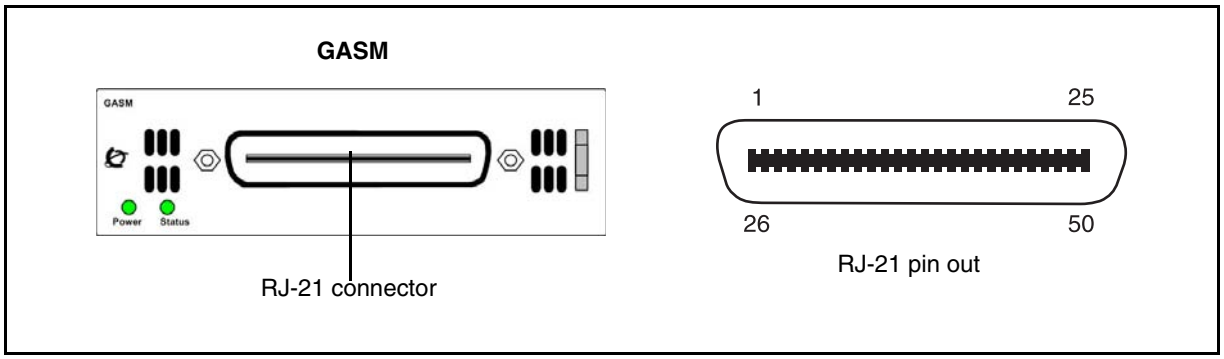
Figure 32 DSM16 and DSM32 RJ-21 connectors



ASM8, ASM8+, and GASM wiring chart

Analog telephony devices, such as single line telephones, modems and Fax machines, connect to the Analog Station Module (ASM) through the RJ-21 connector on the front of the media bay module. To view the connector, see Figure 33 ASM8, ASM8+, and GASM connector (page 139).

Figure 33 ASM8, ASM8+, and GASM connector



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Installation — System

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